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ABSTRACT

This is the first edition of the Energy Research and Development Administration (ERDA) catalog of available motion picture films. One hundred and eighty-eight films, principally relating to energy, are briefly described and classified into three understanding levels. All films are loaned free; complete borrowing instructions and request forms are provided. (SL)

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Energy Films Catalog

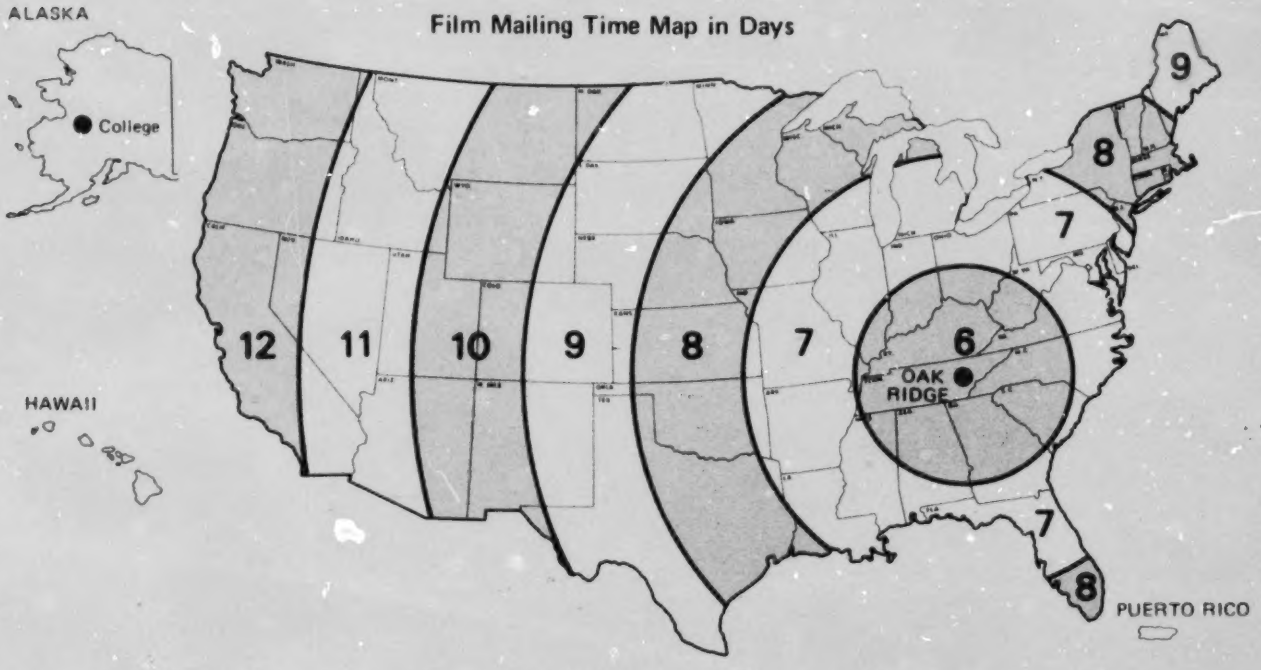
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION

SE 021 397

NOTICE

Energy Research and Development Administration (ERDA) films are available as FREE LOAN for SCHOOLS, THE PUBLIC and TELEVISION for non-profit exhibition. All requests for ERDA films should be sent to this address (except as noted below):

ERDA FILM LIBRARY
P. O. Box 62
Oak Ridge, Tennessee 37830



Film requests from Hawaii for popular or technical films should be sent to the library which stocks these films:

University of Hawaii
CTA Film Library—ERDA Popular Films
Krauss Hall, Room 108
2500 Dole Street
Honolulu, Hawaii 96822

University of Hawaii
AV Services—ERDA Technical Film Library
Honolulu, Hawaii 96822
Phone: 808-944-8111

Film requests from Alaska should be sent to:

Alaska State Library
Instructional Materials Center
Pouch G
Juneau, Alaska 99801
Phone: 907-465-2919

Film requests from Puerto Rico should be sent to:

Film Library
Puerto Rico Nuclear Center
Caparra Heights Station
San Juan, Puerto Rico 00935
Phone: 767-0350

For general information, advice or special assistance on film matters, write or call:

Sid L. Schwartz, Motion Picture Officer
ERDA, Office of Public Affairs
Washington, D. C. 20545
Phone: 301-973-4239

Willie E. Clark
ERDA, Film Librarian
P. O. Box 62
Oak Ridge, Tennessee 37830
Phone: 615-483-8611, Ext. 3-4161

ENERGY FILMS CATALOG

Energy Research and Development Administration

1976

Inquiries concerning this catalog should be directed to:

Audiovisual Branch
Office of Public Affairs
Energy Research and Development Administration
Washington, D.C. 20545
Telephone: Area Code 301/973-4239

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Introduction to Catalog

With this 1976 first edition, the United States Energy Research and Development Administration (ERDA) introduces a collection of 188 motion pictures on many of the energy options and related activities. All these films are available for free loan.

Through a series of indexes, the films can be easily located by subject or title: every film is simply coded for audience levels of understanding; television clearance is stated; producers, sponsors, sales sources are listed.

All films are described for easy reference by schools, television stations, civic clubs, government and industrial organizations interested in *educational and informational films* as well as *technical and professional films* on energy and energy related subjects. To help teachers, broadcasters and program chairmen select films which will suit the understanding levels of students and other audiences, all titles are indicated as suitable for three Understanding Levels:

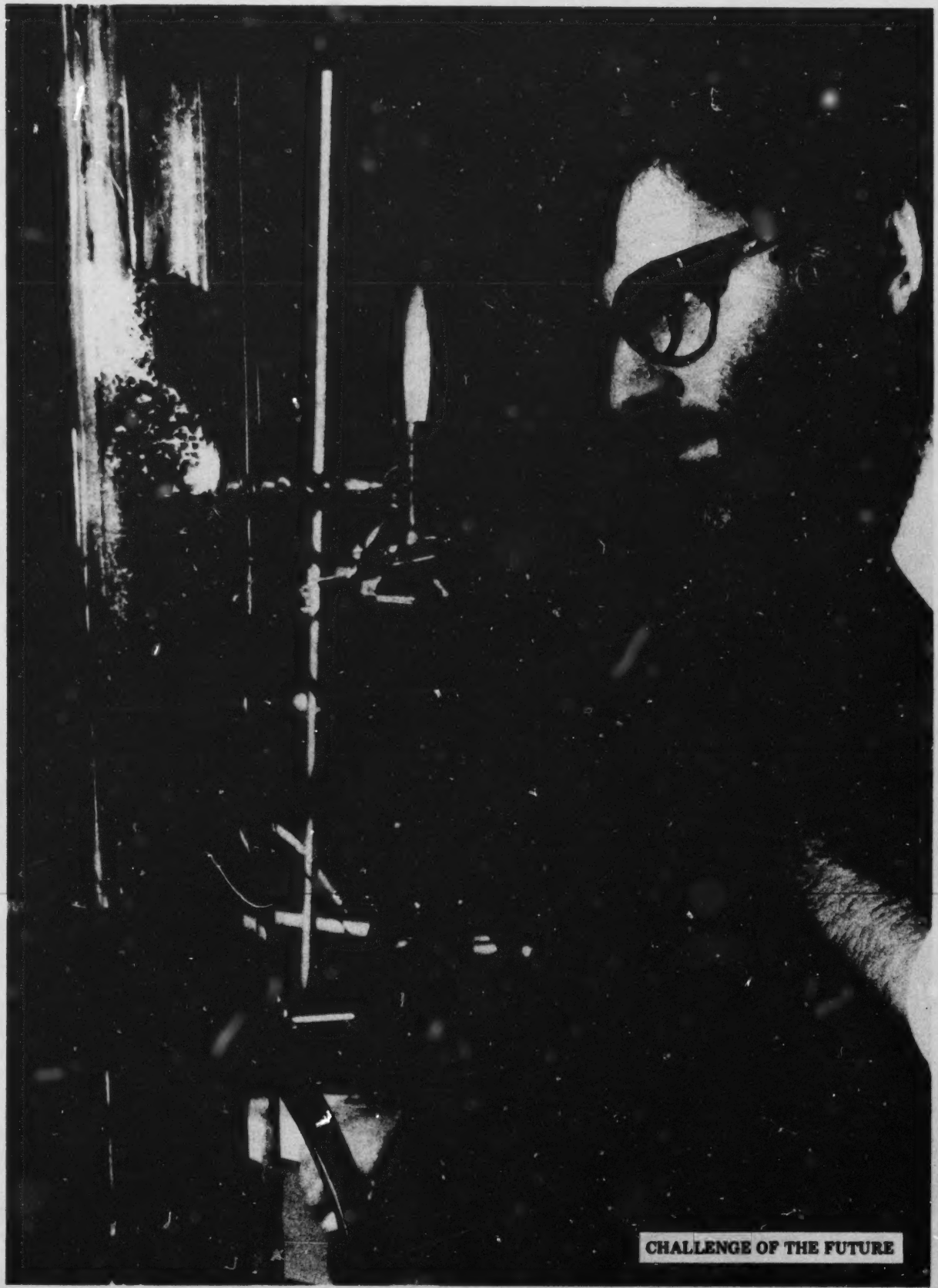
Understanding Level-1 for Elementary School

Understanding Level-2 for Junior and Senior High School

Understanding Level-3 for College and University; Industry; Researchers, Scientists; Engineers and Technologists

We heartily acknowledge that this catalog follows the general format and pattern of A CATALOG OF UNITED STATES GOVERNMENT PRODUCED AUDIOVISUAL MATERIALS (1974-75) published by the National Audiovisual Center, General Services Administration, National Archives and Records Service. And special thanks to Ed Westcott, Photo Officer, Office of Public Affairs, for selecting and cropping all the photographs and particularly for permitting us to use the cover illustration which is repeated as the illustration for A SEA WE CANNOT SENSE. This photograph from his private collection was made at Ocean City, Maryland, Easter Sunday 1974.

Sid L. Schwartz,
Editor


CHALLENGE OF THE FUTURE

About ERDA

The Energy Research and Development Administration

Energy—its shortages, rising costs, more efficient use, and the development of new sources—is getting considerable attention all around the world.

The United States has become acutely aware of the growing need for mobilizing a national effort to get through its present energy difficulties and to avoid new ones in the future. A key element in the Federal response to these energy problems was the creation of the new Energy Research and Development Administration which was activated on January 19, 1975.

ERDA brings together into a single agency the major energy research and development programs of the Federal Government aimed at finding ways to increase the supply of energy as well as to conserve the energy already available.

ERDA will do this by providing a sound organizational and programmatic base for moving ahead rapidly. It will advance the state of energy technology in all promising areas including such fossil energy techniques as coal gasification and liquefaction; nuclear fission and fusion; solar, geothermal, and other advanced energy systems.

The agency's mission, as defined by Congress, is to develop all energy sources to meet the needs of present and future generations; to increase the productivity of the national economy and make the nation self-sufficient in energy; to restore, protect and enhance the environment; and to assure public health and safety. In brief, ERDA will direct major efforts that eventually will enable the nation to attain the goal of meeting the nation's energy requirements without the need to rely on foreign sources.

In this effort, ERDA will draw heavily on the proven expertise of the program components inherited from the Department of the Interior, the National Science Foundation, the Environmental Protection Agency, and the former Atomic Energy Commission. It will also work closely with the industrial and academic communities, recognizing that the ultimate achievement of ERDA's mission depends on the smooth transfer of proven energy technology to the private sector for commercial application and prompt benefit to all American citizens.

ERDA functions are divided into six major categories: fossil energy; solar, geothermal, and advanced energy systems; nuclear energy; energy conservation; environment and safety; and national security.

Catalog Format and Use

A. Catalog Format

The catalog has been organized with energy subject headings and sub-headings. The new format includes:

1. **OUTLINE OF SUBJECT HEADINGS** Page 1
   The handiest method of determining the actual subject heading in the catalog that contains your specific area of interest.
   Example:
   SOLAR ENERGY
   General
   Applications
   Research

2. **SUBJECT SECTION** . . . . . Page 3
   This section contains all titles in alphabetical order listed under appropriate subject headings.
   Example:
   NUCLEAR POWER
   General
   ATOMIC POWER PRODUCTION
   ATOMIC POWER TODAY
   (and so on)
   Fuels Processing and Handling
   CURRENT METHODS IN PLUTONIUM FABRICATION
   FIFTH FUEL, THE
   Waste
   WASTE DISPOSAL BY HYDRAULIC FRACTURING

3. **FILM TITLES SECTION** . . . . . Page 9
   The FILM TITLES SECTION lists all the titles in the catalog in alphabetical order.

4. **FILM DESCRIPTION SECTION** . . Page 11
   The FILM DESCRIPTION SECTION with title entries in alphabetical order provides all the descriptive information that pertains to a particular title.
   Example:
   CHALLENGE OF THE FUTURE (1975). 29 minutes, color.
   (Insert identical type and make up the full description as it will appear in the catalog)

5. **FILM TITLE NUMBERS**
   Every entry in the catalog has been assigned a distinct title number. Always use the title number when ordering films.

6. **SERIES**
   Films in series are listed in the FILM TITLES SECTION under the series title. The components of the series are also listed individually; this entry will indicate "From the . . . series . . . (name)."

7. **INSERTS AND SUPPLEMENTS**
   Inserts describing individual films and supplements will be published periodically and will contain all new films accumulated since the publication of this edition.

B. How to use the catalog

1. **By title:** If you have a specific title in mind, look directly in the FILM TITLES SECTION . Page 9

2. **By subject:** When you find the subject of interest in the OUTLINE OF SUBJECT HEADINGS, starting on . . . . . Page 1
   then look at the OUTLINE OF SUBJECT SECTION starting on . . . . . Page 3
   and choose the film title. The film description will be listed alphabetically in the FILM TITLES SECTION starting on . . . . . Page 9

3. **By browsing:** Consult the OUTLINE OF SUBJECT HEADINGS and choose headings of interest. Look these up in the SUBJECT SECTION where applicable titles will be listed under the subject headings. Detailed information on selected titles of interest may be found in the FILM DESCRIPTION SECTION.

How to Borrow Films

As part of its information and education program, the U. S. Energy Research and Development Administration (ERDA) maintains one consolidated motion-picture library in Oak Ridge, separate libraries in Alaska, Hawaii, and Puerto Rico, and special sublibraries which serve regional needs from which qualified borrowers throughout the United States may obtain 16-mm sound films that explain various aspects of energy.

All these films are loaned free, and only for educational, nonprofit, and noncommercial screenings.

Additional copies of this catalog may be obtained from the Audio-Visual Section, Office of Public Affairs, ERDA, Washington, D. C. 20545; or the ERDA Film Library, P. O. Box 62, Oak Ridge, Tenn. 37830.

Catalog inserts and supplements are issued periodically, send for them.

WHO MAY BORROW

Bona fide representatives of educational, civic, industrial, professional, youth activity, and government organizations are invited to borrow films. Because of wear and tear that result from repeated projection, films are loaned for *group* showings, and *not* for screening before individuals or in homes. Because custody of the films involves both legal and financial responsibility, films cannot be loaned to minors.

HOW TO ORDER

The ERDA Film Library enjoys heavy patronage throughout the year, so it is important that borrowers needing particular titles should make their requests as far in advance of their scheduled showing date as possible. Since some titles are booked solidly in advance for several months, borrowers should attempt to specify at least two other acceptable titles and one other acceptable alternate showing date or indicate that First Available Date is all right. In making requests, always include both the film number and the full film title and use the request forms provided in the back of this catalog.

CIVIL RIGHTS

The loan of films directly or indirectly from an ERDA motion picture library constitutes Federal financial assistance and is subject to the provisions of Title VI of the Civil Rights Act of 1964 as amended and implementing regulations. No person shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity in which such films are used.

LOAN REQUIREMENTS

The following requirements apply to all films and all borrowers, regardless of which ERDA Film Library provides the service:

1. Projection must be on good motion picture sound equipment, and by a *trained* operator.

2. No borrower under any circumstances may remove—even temporarily—any footage from ERDA library films on loan to him, either to delete damaged sprocket holes or to edit or digest selected scenes.

3. Films do break, and occasionally will require splicing by the borrower. However, we prefer that damaged films be returned to the libraries for the professional repairs available there. Do not use "scotch" tape for emergency splices. Unrepaired damage should be noted on the computer statistical card so that the film may be repaired before it is shipped to the next borrower.

4. Borrowers planning to show a number of films on a protracted schedule should request delivery of specific films on a staggered schedule to facilitate maximum use by other borrowers. No borrower may hold a film past scheduled return date without express prior permission of the issuing library.

5. No borrower may release an ERDA film from his personal possession for reloan to another individual or agency without express prior permission of the issuing ERDA library. Except where heavy demand requires tighter scheduling, borrowers are normally allowed to retain films for two or three days.

6. Borrowers are obligated to complete the computer statistical card form enclosed with each film.

7. Films are shipped from the libraries at government expense, but return shipment charges are borne by the borrower.

8. Films are normally shipped by 4th class Book Rate, but it is the borrower's responsibility to use any available means—including air express, air mail, or personal delivery—to assure that films being returned will reach the libraries on or before the due date.

9. Rewind films for return.

Optimum service to the thousands of borrowers utilizing ERDA Film Libraries is possible only when each individual

borrower complies fully with these requirements. Failure of a borrower to follow the instructions of the library that has serviced his request may result in suspension of the service to the borrower and his organization.

TELEVISION CLEARANCE AND USE

Television stations may order films for unsponsored public service or sustaining telecasts, except those titles described as "NOT Cleared for Television." Films selected for television use must be telecast in their entirety.

VIDEO COPYING

Video copying of most of *ERDA produced films* is permitted by schools and television stations after requesting and obtaining written permission from the Audiovisual Branch, Office of Public Affairs, ERDA, Washington, D. C. 20545. Certain films that appear in this catalog are privately owned and permission must be obtained from the owner, see FILMS TITLES INDEX LISTING PRODUCERS, SPONSORS AND SALE SOURCES . . . page 63.

CANADIAN BORROWERS

Residents of Canada may obtain many of the films in this catalog from the *National Science Film Library*, Canadian Film Institute, 1762 Carling St., Ottawa 13, Canada, with a service charge for handling.

ADVICE TO FOREIGN BORROWERS

Because most of the titles stocked by the ERDA film libraries are in heavy demand by U. S. borrowers and because shipments abroad would involve lengthy, nonproductive periods in transit, it is not considered practical to extend this film library service to other than U. S. borrowers.

However, a number of titles listed in this catalog have been acquired by the U. S. Information Agency for use in various U. S. Information Service film libraries throughout the world. Residents of each nation should seek assistance directly from the nearest U. S. Information Service at the American Embassy in the capital city of their country.

In addition, prints owned by ERDA are available for loan to the U. S. Information Agency in Washington, which will arrange to provide prints on a brief loan basis to the U. S. Information Service posts overseas.

Also, ERDA stocks films at the American embassy in Tokyo, where the films are maintained by the U. S. Information Service.

In addition, many of the films in this catalog are available from the film library of the International Atomic Energy Agency, Vienna, Austria; the National Science Film Library, Ottawa, Canada; the American Film Library, The Hague, Holland; and in the Film Section of the Personnel Administration Council, Stockholm, Sweden.

HOW TO PURCHASE FILMS

Most films listed in this catalog may be purchased from the National Audiovisual Center (NAC), Washington, D. C. 20409 or from private commercial suppliers -NOT from ERDA. It is suggested that organizations which have continuing requirements for repeated screening of the same film may find it more satisfactory, and perhaps more economical, to own a print than to borrow it.

In the FILM TITLES INDEX LISTING PRODUCERS, SPONSORS AND SALES SOURCES, page 63, the supplier from whom prints may be purchased is indicated. Prospective purchasers should obtain up-to-date quotations before ordering, by writing to the proper suppliers.

HOW TO OBTAIN STOCK FOOTAGE

To encourage education and information in the field of energy, ERDA has made available for motion picture and television producers color stock film footage covering many aspects of this broad program.

Color stock footage in 16mm is available from the completed motion pictures made by or for ERDA. Producers can obtain duplicating materials by *buying* complete masters from these films; tab-to-tab orders are not accepted. However, in some cases tab-to-tab scenes are available from special A-wind masters of current and popular films on deposit at the National Archives Stock Film Library—to arrange for search and purchase contact Director, National Archives Stock Film Library, 1411 South Fern Street, Arlington, Virginia 22202, telephone: 202/557-1114.

Producers are invited to contact the Audio-Visual Branch, Office of Public Affairs, ERDA, Washington, D. C. 20545, telephone: 301/973-4239, for information and advice. Producers are *not* permitted to clip or cut sections of films borrowed from the film libraries.

Outline of Subject Headings

ACCELERATOR
AGRICULTURE
ANTHROPOLOGY
  Archeology
  Ethnology
ATOMIC ELEMENTS
ATOMIC ENERGY
  General
  Industrial Uses
  Principles
ATOMIC POWER (See NUCLEAR POWER)
BEVATRON (See ACCELERATOR)
BIOLOGY
  General
  Photosynthesis
  Radioactive Tracers
BREEDER REACTOR
CAREERS
CHALLENGE SERIES
CHEMISTRY
COMPUTERS (See DATA PROCESSING)
CONSERVATION
CONTROLLED THERMONUCLEAR REACTOR
  (See FUSION)
CYCLOTRON (See ACCELERATOR)
DATA PROCESSING
ELECTRICITY
ENERGY
ENERGY CENTERS (See NATIONAL LABORATORIES
  and ENERGY CENTERS)
ENGINEERING
ENVIRONMENT
FOSSIL
FUSION
GEOTHERMAL
ISOTOPES (See RADIATION; See RADIOISOTOPES)
MEDICINE
  General
  Diagnosis and Therapy
  Research
METALLURGY (See RESEARCH)
NATIONAL LABORATORIES AND ENERGY CENTERS
NATIONAL SECURITY
NUCLEAR POWER
  Fuels Processing and Handling
  General
PEACEFUL NUCLEAR EXPLOSIVES
PERSONALITIES
PHYSICS
RADIATION
  General
  Application
  Detection and Protection
  Medicine
  Neutron Activation
RADIOISOTOPES
RESEARCH
  General
  Photography
  Metallurgy
  Nuclear
RESEARCH AND TEST REACTORS
SAFEGUARDS
SAFETY
SERIES (See CHALLENGE SERIES and
  UNDERSTANDING THE ATOM)
SOLAR ENERGY
  General
  Applications
  Research
SPACE
  General
  SNAP
TRANSPORTATION
UNDERSTANDING THE ATOM SERIES

Subject Section

—Film Titles in Subject Order

ACCELERATOR
- ALCHEMIST'S DREAM, THE
- ATOM SMASHERS
- BEGINNING WITHOUT END, A
- BUILDING AN ATOMIC ACCELERATOR
- EXPLORING THE ATOMIC NUCLEUS
- FABRICATION OF THE ACCELERATOR STRUCTURE
- HEART OF THE MATTER, THE
- HEAVY PARTICLE BEAMS IN MEDICINE
- MANY FACES OF ARGONNE, THE
- MICROSCOPE FOR THE UNKNOWN
- OF MAN AND MATTER
- PEOPLE AND PARTICLES
- SYNCHROTRON
- WORLDS WITHIN, THE

AGRICULTURE
- ATOMS IN AGRICULTURE
- CONTROLLED PHOTOSYNTHESIS
- FARM FRESH TO YOU
- HARVEST OF AN ATOMIC AGE
- PLANT GROWTH IN COMPENSATED FIELDS
- RIDDLE OF PHOTOSYNTHESIS, THE
- ROUNDUP

ANTHROPOLOGY
- Archeology
  - ATOM AND ARCHEOLOGY, THE
  - ATOMIC FINGERPRINT, THE
  - NUCLEAR FINGERPRINTING
- Ethnology
  - FEAST, THE
  - YANOMAMA: A MULTI-DISCIPLINARY STUDY

ATOMIC ELEMENTS
- A IS FOR ATOM
- ALCHEMIST'S DREAM, THE
- ATOM IN PHYSICAL SCIENCE, THE
- CONTROLLING ATOMIC ENERGY
- FIRST CHEMICAL SEPARATION OF LAWRENCIUM
- FUEL OF THE FUTURE, THE
- JOURNAL OF PLUTONIUM, A
- INTRODUCING ATOMS AND NUCLEAR ENERGY
- MASS OF ATOMS, THE
- TRANSCURIUM ELEMENTS: SYNTHESIS, SEPARATION AND RESEARCH
- TRANSURANIUM ELEMENTS

ATOMIC ENERGY
- General
  - MIGHTY ATOM, THE
- Industrial
  - ATOMIC REVOLUTION IN WOOD
  - BITTER AND THE SWEET, THE
  - DESALTING THE SEAS
  - NUCLEAR INNOVATIONS IN PROCESS CONTROL
  - OPPORTUNITY UNLIMITED: FRIENDLY ATOMS IN INDUSTRY
  - PAX ATOMIS: SNAP-7 TERRESTRIAL ISOTOPIC POWER SYSTEMS
- Principles
  - A IS FOR ATOM
  - ALPHA, BETA AND GAMMA
  - ATOMIC PHYSICS
  - BASIC PRINCIPLES OF POWER REACTORS
  - CONTROLLING ATOMIC ENERGY
  - INTRODUCING ATOMS AND NUCLEAR ENERGY
  - MAN AND RADIATION
  - NUCLEAR REACTIONS
  - PROPERTIES OF RADIATION
  - SEARCHING FOR THE ULTIMATE

ATOMIC POWER (See NUCLEAR POWER)

BIOLOGY
- General
  - BIOENGINEERS, THE
  - DOORWAY TO DIAGNOSIS
  - ENDLESS CHAIN
  - MANY FACES OF ARGONNE, THE
  - MOLECULAR BIOLOGY
  - NATURE'S FORGE
  - PLANT GROWTH IN COMPENSATED FIELDS
  - RADIOISOTOPES IN BIOLOGY AND AGRICULTURE
  - NO TURNING BACK
  - WARM COAT, THE
  - WEB OF LIFE: ENDLESS CHAIN
  - ZONAL CENTRIFUGE, THE
- Photosynthesis
  - CONTROLLED PHOTOSYNTHESIS
  - RIDDLE OF PHOTOSYNTHESIS, THE
- Radioactive Tracers
  - ATOMS IN AGRICULTURE
  - COMBUSTION TECHNIQUES IN LIQUID SCINTILLATION COUNTING
  - FARM FRESH TO YOU
  - FRESHER THE BETTER, THE
  - HARVEST OF AN ATOMIC AGE
  - RETURN TO BIKINI
  - ROUNDUP

BREEDER REACTOR
- BREEDER IN THE DESERT, A
- HANFORD OR BUST
- LANDMARK
- MOLTEN SALT REACTOR EXPERIMENT
- NUCLEAR POWER IN THE UNITED STATES
- PRINCIPLES OF THERMAL, FAST AND BREEDER REACTORS

CAREERS
GO FISSION
HORIZONS UNLIMITED
PREPARING FOR TOMORROW'S WORLD
YOUR PLACE IN THE NUCLEAR AGE

CHALLENGE SERIES
ALCHEMIST'S DREAM, THE
ART OF SEPARATION, THE
ATOMIC FURNACES
BUILDING BLOCKS OF LIFE
CHEMICAL SOMERSAULT, A
DOWN ON THE FARM
FUEL OF THE FUTURE, THE
HARNESSING THE RAINBOW
IMMUNE RESPONSE, THE
INVISIBLE BULLETS
LIVING SOLID, THE
MICROSCOPE FOR THE UNKNOWN
RADIATION AND THE POPULATION
SEARCHING FOR THE ULTIMATE
TESTING FOR TOMORROW
TIME—THE SUREST POISON
TRACING LIVING CELLS
WORKING WITH RADIATION

CHEMISTRY
ART OF SEPARATION, THE
BEGINNING WITHOUT END, A
BIOENGINEERS, THE
BROOKHAVEN SPECTRUM
CHEMICAL SOMERSAULT, A
COMBUSTION TECHNIQUES IN LIQUID SCINTILLATION COUNTING
DOWN ON THE FARM
FIRST CHEMICAL SEPARATION OF LAWRENCIUM
RADIATION EFFECTS IN CHEMISTRY
XENON TETRAFLUORIDE

COMPUTERS
(See DATA PROCESSING)

CONSERVATION
CHALLENGE OF THE FUTURE
WHEN THE CIRCUIT BREAKS

CONTROLLED THERMONUCLEAR REACTION
(See FUSION)

DATA PROCESSING
ACCEL REVISITED: AUTOMATED CIRCUIT CARD ETCHING LAYOUT
COMPUTER COLOR GENERATION
COMPUTER FLUID DYNAMICS
INTRODUCTION TO ANALOG COMPUTERS
LINK
SANDIA SPINOFF

ELECTRICITY
BEGINNING WITHOUT END, A
CHALLENGE OF THE FUTURE
ENERGY—THE AMERICAN EXPERIENCE
SUPERCONDUCTING MAGNET FOR FUSION RESEARCH
SUPERCONDUCTING MAGNETS
WHEN THE CIRCUIT BREAKS

ENERGY
CHALLENGE OF THE FUTURE
ENERGY—THE AMERICAN EXPERIENCE

ENERGY CENTERS
(See NATIONAL LABORATORIES and ENERGY CENTERS)

ENGINEERING
CHALLENGE OF THE FUTURE
COMPUTER COLOR GENERATIONS
COMPUTER FLUID DYNAMICS
ENERGY—THE AMERICAN EXPERIENCE
ENVIRONMENTAL TESTING AT SANDIA
FUNDAMENTALS OF MECHANICAL VIBRATION
HANFORD OR BUST
RESPONSE TO MECHANICAL SHOCK
SANDIA SPINOFF

ENVIRONMENT
ATOM AND THE ENVIRONMENT, THE
CLEAN AIR IS A BREEZE
ENDLESS CHAIN
ENVIRONMENTAL TESTING AT SANDIA
ISOTOPES IN ENVIRONMENTAL CONTROL
NATURE'S FORGE
NO TURNING BACK
NUCLEAR POWER AND THE ENVIRONMENT
PARK, THE
WARM COAT, THE
WEB OF LIFE

FOSSIL
PROJECT GASBUGGY
CHALLENGE OF THE FUTURE
ENERGY—THE AMERICAN EXPERIENCE

FUSION
BEGINNING WITHOUT END, A
CHALLENGE OF THE FUTURE
COMPUTER COLOR GENERATIONS
SUPERCONDUCTING MAGNET FOR FUSION RESEARCH, A
TO BOTTLE THE SUN
TO IMITATE THE SUN

GEOTHERMAL
CHALLENGE OF THE FUTURE
POWER FROM THE EARTH
TERRADYNAMICS
WHEN THE CIRCUIT BREAKS

ISOTOPES
(See RADIATION and RADIOISOTOPES)

MEDICINE
General
ATOMIC MEDICINE
BIOENGINEERS, THE
BROOKHAVEN SPECTRUM
CLEAN AIR IS A BREEZE
CONTROLLING ATOMIC ENERGY
Diagnosis and Therapy
ACROMEGALY: DIAGNOSIS, ETIOLOGY, THERAPY
DOORWAY TO DIAGNOSIS
EXTRACORPOREAL IRRADIATION OF BLOOD AND LYMPH
HEAVY PARTICLE BEAMS IN MEDICINE
RADIATION ACCIDENT PATIENTS
RADIOISOTOPE SCANNING IN MEDICINE
SCINTILLATION CAMERA, THE
SHORT-LIVED RADIOISOTOPES IN NUCLEAR MEDICINE
Research
BEGINNING WITHOUT END, A
BROOKHAVEN SPECTRUM
IMMUNE RESPONSE, THE
NUCLEAR SPECTRUM

RADIOISOTOPE POWERED CARDIAC PACEMAKER, THE
ZONAL ULTRA CENTRIFUGE. THE

METALLURGY
(See RESEARCH)

NATIONAL LABORATORIES AND ENERGY CENTERS
ATOMIC SEARCH
ATOMS FOR THE AMERICAS (Puerto Rico Nuclear Center)
BEGINNING WITHOUT END, A (Lawrence Berkeley and Lawrence Livermore Laboratory)
BIOENGINEERS, THE (Holifield National Laboratory)
BROOKHAVEN SPECTRUM (Brookhaven National Laboratory)
CHALLENGE OF THE FUTURE (Several National Laboratories and Energy Centers)
FIRST 25 YEARS, THE (Los Alamos Scientific Laboratory)
MANY FACES OF ARGONNE, THE (Argonne National Laboratory)
MASS OF ATOMS, THE (Mound Laboratory)
METALS FRONTIER (Ames Laboratory)
MIRACLE IN THE DESERT: THE STORY OF HANFORD (Pacific Northwest Laboratories and the Hanford Works)
NEW POWER, THE (Idaho National Engineering Laboratory, formerly the National Reactor Testing Station)
PARK, THE (Savannah River Laboratory)
STORY OF OAK RIDGE OPERATIONS, THE (Holifield National Laboratory)

NATIONAL SECURITY
DAY TOMORROW BEGAN, THE
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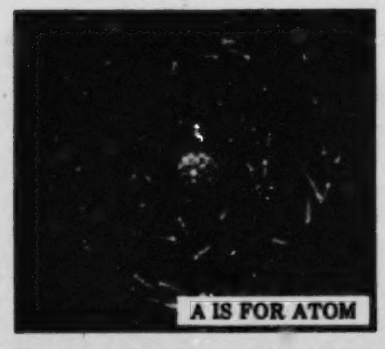
Film Description Section

0001
A IS FOR ATOM (1964). 15 minutes, color.

Suitable for Understanding Levels-1 and -2.

NOT CLEARED FOR TV.

Begins by describing how the atomic age was born. A nontechnical explanation and illustration of the basic structure of the atom, using an analogy to the solar system, is presented. Fundamental differences of elements in terms of both their atoms and isotopes are discussed and illustrated. The film introduces the concepts of stable and radioactive elements. Also presented are the basic structure and principles of a nuclear reactor. The importance of reactors in the formation of the first man-made elements is described.



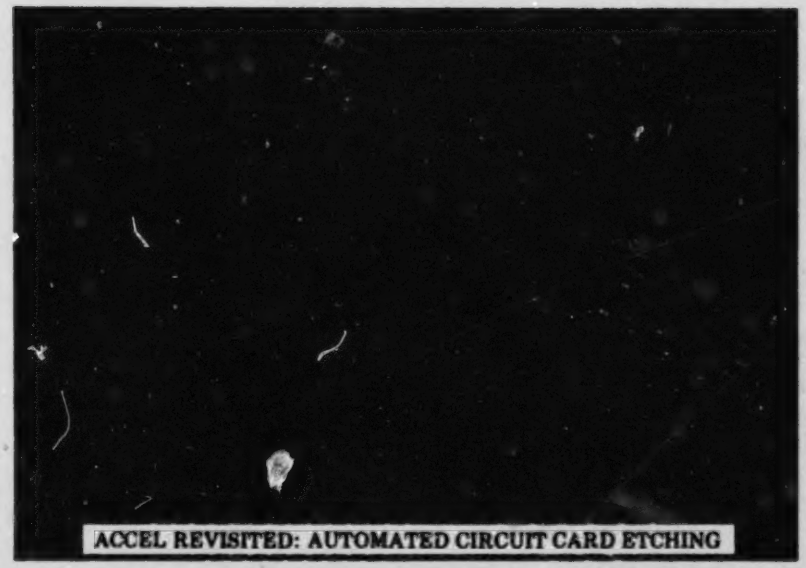
The film proceeds to explain how a chain reaction is produced and controlled. Concluding the film is a description of the many applications of atomic energy. Atomic energy is depicted as a vast source of power for the present and future. This summary reviews some of the many benefits of atomic radiation in industry, biology, medicine, and agriculture.

0422
ACCEL REVISITED: Automated Circuit Card Etching Layout (Revised 1968). 20 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

ACCEL is a computer program which designs printed circuit boards and produces the drawings for their construction with the input encoded from an engineer's schematic diagram by a clerk without knowledge of electronics. The outputs of the program are a schematic, parts list, printed circuit negative, assembly drawing, and a hole drilling list. ACCEL is written in Fortran II for the IBM 7090 computer and the drawings are produced on the Stromberg Carlson 4020 cathode ray tube plotter. The film describes the operational aspects of the system, as well as the unusual algorithms used to accomplish the design feat. Two items of major significance are (1) the "force placement" algorithm for determining component location; and (2) a routing method utilizing Lee's algorithm and a new technique called topographic simulation.



HONORS: British Computer Society's Data Fair; Spring Joint Computer Conference, Atlantic City, New Jersey; Placque, International Federation of Information Processing Congress, Ljubljana, Yugoslavia.

ORDER BY FILM NUMBER AND TITLE

0004
ACROMEGALY: DIAGNOSIS, ETIOLOGY, THERAPY (1965). 23 minutes, color.

Suitable for Understanding Level-3.

NOT CLEARED FOR TV.

Describes the successful application of heavy particle radiation, obtained from high energy cyclotrons for treatment of the comparatively rare disease, acromegaly. Work at Donner Laboratory in Berkeley with the 184-inch synchrocyclotron for treatment of acromegalic patients is described. Detailed procedures for preparing the patient and irradiating the pituitary gland are shown. Symptoms, diagnosis, etiology, and medical history and medical treatments also are discussed.

HONORS: 3rd International Festival on Medicine & Public Health, Bologna, Italy.

0486
AN ADDED SENSE: THE DETECTION OF NUCLEAR RADIATION (1972). 24 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

To harness the power of the atom effectively, the technology to control nuclear energy and safeguard its use must be assured. Consequently the key to practical application of atomic energy is instrumentation. Through animation, the film presents significant concepts associated with detector technology, such as: the various forms of nuclear radiation, gas ionization chambers and their design, proportional and scintillation counters, and several unique methods including thermoluminescence.

To demonstrate the wide use and application of nuclear detectors, various research activities at ERDA's Lawrence Livermore Laboratory are shown, including: a pool-type nuclear reactor; health physics and personnel dosimetry techniques and instruments, including a Whole Body Counter; biomedical investigations to search for sources of radioactivity in the environment and to study the effects of radiation on plant and animal life; the field of X-ray Astronomy where unique instruments to measure the low energy x-rays emanating from celestial bodies are described, and many other unique applications of detectors. The film summarizes the state of the art in detector technology, and provides an excellent insight into the great challenge to scientists and engineers to advance our knowledge and control of nuclear phenomena.

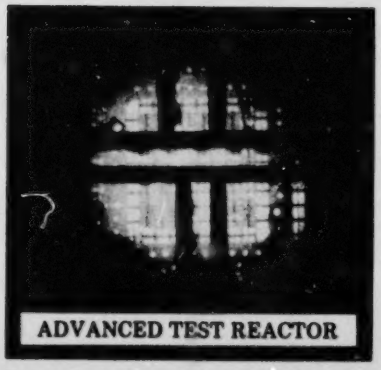
HONORS: 6th International Festival of Scientific and Technical Films, Brussels, Belgium; 3rd International Film Festival of Prevention (Labor Accidents and Professional Diseases) Oporto, Portugal; 5th International Scientific Film Festival, Rio de Janeiro, Brazil; 20th International Exhibition of Specialized Cinematography ("Nuclear Rassegna") Rome, Italy; CINE 16th Annual Awards Presentation Ceremonies and Exhibition of Films of Merit, Washington, D. C.; 12th ANZAAS International Scientific Film Exhibition, Australia and New Zealand; 11th International Festival of Science Fiction Films, Trieste, Italy.

0005
ADVANCED TEST REACTOR (1964). 9 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

This film uses animation to show precisely how the 250 Mw(t) Advanced Test Reactor design utilizes multiple flux traps to achieve exceptionally high neutron density in nine independent test loop positions. It describes the clover leaf, enriched fuel annulus that circumscribes the nine



ADVANCED TEST REACTOR

flux trap test positions, and the moving control components which vary flux and power in each test position. ATR was designed by Ebasco Services, Inc., as prime contractor, with Babcock & Wilcox Co. as nuclear subcontractors. Phillips Petroleum Co. prepared the conceptual design and will operate the reactor.

0492
AIRBORNE ECLIPSE EXPEDITION-1972 (1973), 12 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Early on the morning of July 10, 1972, a team of 29 scientists left Fairchild Air Force Base, Spokane, Washington, aboard the Air Force NC 135 "Flying Laboratory," a scientifically modified aircraft. The aircraft intercepted the moon's shadow nearly eight miles above Canada's Northwest Territories to record and study a total solar eclipse.

AIRBORNE ECLIPSE EXPEDITION

The major observation included photographic polarimetry of the corona out to a distance of 12 solar radii from the sun's center.

Measurements were taken (in cooperation with Sacramento Peak Observatory solar astronomers) of the shape, strength, and polarization of several emission lines of highly ionized iron in the corona. This experiment makes use of a large refracting telescope, a Fabry-Perot interferometer and a Savart plate which projects the corona on an image orthicon for data storage on magnetic tape.

Measurements of the albedo of the earth before and during eclipse totality were carried out by Greek scientists, and looked not up at the corona, but down at the ground in an attempt to measure changes in the earth's reflectivity as the moon's shadow passed over.

Most of the experiments aboard the aircraft were designed to probe the corona at distances farther from the sun's surface than is possible when the same experiments are performed on the ground. This film deals with the preparation, scientific equipment used and photographic results obtained from this expedition. It includes actual live motion picture footage of the various phases of the eclipse through totality and the 3rd or "diamond ring" phase, one of the more spectacular stages of a total eclipse.

ORDER BY FILM NUMBER AND TITLE

0011
THE ALCHEMISTS'S DREAM (1965). 29 minutes, black and white.

(From the Challenge Series.)

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Transmutation of metals, the dream of the alchemists in the Middle Ages, is shown and explained in its nuclear science context by members of ERDA's Argonne National Laboratory Chemistry Division. A minute quantity of berkelium is produced by bombarding curium with deuterons from a cyclotron. The berkelium is separated and purified behind the thick walls of a newly constructed hot laboratory for research with man-made elements. This film provides an in-depth description of basic research in the nuclear sciences.

0013
ALPHA, BETA, AND GAMMA (1962). 41 minutes.

(From the Understanding the Atom Series.)

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Gives some insight into the origin and nature of alpha, beta, and gamma radiation. After a short discussion of the methods of describing atoms and the introduction of the energy-level concept, the lecturer, Dr. Ralph T. Overman, former Chairman, Oak Ridge Institute of Nuclear Studies, introduces the potential-energy well model of the nucleus. This, together with the barrier model, is used as the

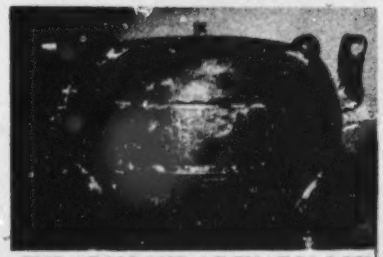
frame of reference for a variety of other nuclear concepts. The energetics in alpha emission and the Gamow tunneling effect are used to describe alpha-ray emission and the energy levels in the nucleus. The lecturer discusses neutron absorption leading to the formation of nuclei having neutron–proton ratios differing from stable or naturally occurring nuclei. The transformation of excess neutrons into negative beta radiation and the return to stability are considered in some detail. This film was designed for a high school senior-level chemistry or physics course, or as an introductory unit in nuclear science at the college level.

0476
ANALYSIS OF NUCLEON–NUCLEON SCATTERING EXPERIMENTS (1961). 50 minutes, color.
Suitable for Understanding Level-3.
CLEARED FOR TV.
This filmed lecture by Dr. H. Pierre Noyes is intended primarily for graduate courses in nuclear physics. It gives an overall picture of the route followed in passing from single-, double-, and triple-scattering experiments to a unique description of the scattering matrix in terms of phase shifts. Topics mentioned: relation between scattering cross section and scattering amplitude; expression of conservation of angular momentum and of number of particles by writing the scattering amplitude in terms of phase shifts; relation between range of the force and the number of angular-momentum states present; relation between quantum mass and range of force; inclusion of one-pion exchange effects in the phase-shift analysis; the number of independent scattering experiments using two spin-$\frac{1}{2}$ particles, illustrated by three-dimensional models for the experiments P, D, R, A, C_{nn} and C_{kp}; and problems encountered in trying to determine the best phase-shift solution in terms of least squares. (See also DISPERSION THEORY APPROACH TO NUCLEON–NUCLEON SCATTERING on page 25).

0019
THE ART OF SEPARATION (1962).
29 minutes, black and white.
(From the Challenge Series.)
Suitable for Understanding Levels-2 and -3.
CLEARED FOR TV.
Deals with the separation of chemical compounds into basic substances in the purest form possible by the process known as chromatography and with the importance of that process in chemistry work. Using radiation, the

chemist is able to work with much greater speed and ease in the field of chromatography. The basic principles and various methods of modern chromatography are explained and demonstrated. Actual separation of a chemical compound is shown. The film provides an in-depth description of basic research in the nuclear sciences at ERDA's Argonne National Laboratory.

0505
THE ATOM AND ARCHAEOLOGY (1975). 25 minutes, color.
Suitable for Understanding Levels 2 and 3.
NOT CLEARED FOR TV.



New tools of atomic energy have enabled archaeologists to make more progress during the last few years than ever before. Using the Atomic Clock (radio-carbon dating and thermoluminescence), the Atomic Fingerprint (neutron activation analysis) and the Atomic X-ray (neutron radiography), hitherto impenetrable barriers of time have been broken, and new data revealed about ancient civilizations. Pioneer work in progress at research centers is shown, with animation helping to explain the concepts.

Radio-carbon dating (based on the principle that all organic material, when alive, has a standard amount of radioactivity, but when the plant or animal dies, its radioactivity begins to disappear, and the rate of its disappearance can be calculated) is demonstrated at UCLA on the 20,000-year-old jawbone of a buffalo by Dr. Willard F. Libby, who received the Nobel Prize for the invention of the technique.

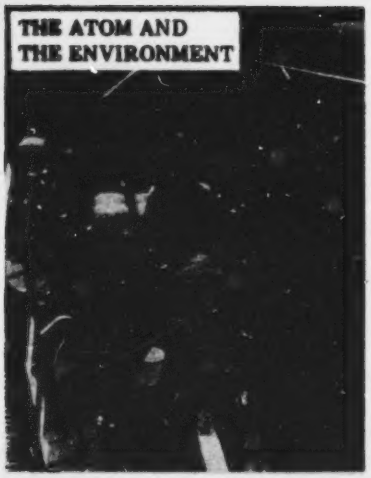
Thermoluminescence (heat causing the emission of light) is used at the Los Angeles County Museum of Art by Dr. Thomas Cairns, who explains the equipment he devised, and tests the authenticity of an art object, a statue of a horse created during the T'ang Dynasty in China more than a thousand years ago.

Atomic Fingerprinting (neutron activation analysis) has now become one of the most important instruments for archaeology. Dr. Frank Asaro of ERDA's Lawrence Berkeley Laboratory at the University of California traces the origin of a pottery fragment found in Cyprus, and explains other neutron activation tests.

Neutron radiography is now executed routinely by a research reactor at Atomics International near Los Angeles. Dr. Cairns takes the atomic x-ray of a Gupta Buddha, revealing the internal structure of the 600-year-old statue.

ORDER BY FILM NUMBER AND TITLE

0462
THE ATOM AND THE ENVIRONMENT (1971). 22 minutes, color.
Suitable for Understanding Levels-2 and -3.
NOT CLEARED FOR TV.
Covers many aspects of how atomic energy directly and indirectly helps in man's fight to preserve and restore his threatened environment. The film shows that atomic power stations do not release smoke containing chemical pollutants into the atmosphere, and how excess heat from coolant water is controlled and minimized, and may be used beneficially for agriculture and recreation. Other aspects: how radioactive carbon is used as a tracer to test the effectiveness of new, improved insecticides, nontoxic to humans and livestock; how neutron activation analysis produces "atomic fingerprints" that identify poisonous pollutants that are killing fish in the Great Lakes, and can analyze and compare oil samples



to help the Coast Guard pinpoint vessels suspected of illegally discharging oil and fouling coastal waters; how radioactive tracers chart the underwater movement of sand which results in clogging of harbors and channels; the use of radioactive tracers to study the ability of flowing streams to purify themselves—resulting in data to aid in the proper placement of sewage plants and factories; how atomic isotopes are used in the analysis of smoke samples and help scientists determine air pollution patterns over cities; and how nuclear tracers assist in the study of the extent to which plants can absorb dangerous pollutants that interfere with the process of photosynthesis, and aid man in learning more about the growing process of plants and trees.

0429
THE ATOM AND THE MAN ON THE MOON (1969). 13 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Describes SNAP-27, its mission and its role in the Apollo program. On an early Apollo flight, astronauts on the moon will install a small scientific laboratory to conduct lunar surface experiments. After they depart for earth, the laboratory—known as ALSEP, Apollo Lunar Surface Packages—will remain, transmitting its research data to receiving stations on earth for several years. ALSEP is powered by electricity from atomic energy—a highly reliable, radioisotope-fueled thermoelectric generator called SNAP-27. The film explains how tiny grains of radioactive plutonium-238 in a sealed fuel capsule generate heat which, in turn, generates electricity directly by means of thermocouples. In simulated action on earth, we see astronauts unloading ALSEP and inserting the nuclear fuel capsule. The film discusses the type of lunar surface information the radioisotope-powered ALSEP will send back to earth, and the temperature stresses and vibration tests to which SNAP-27 has been subjected. Technology developed for SNAP-27 also will be of assistance to the aircraft and other industries.

HONORS: International Association of Machinists & Aerospace Workers Conference, San Jose, California.

0059
THE ATOM IN PHYSICAL SCIENCE (1964). 26 minutes.

(From the Understanding the Atom Series.)

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

This is a lecture by Dr. Glenn T. Seaborg, discoverer of plutonium, who outlines briefly the types of experiments which were used in the production of transuranium elements. These have been discovered using exceedingly ingenious approaches involving quite complex electronics and highly refined chemical techniques.

The film discussed applications to other chemical problems such as the mechanism of photosynthesis and the use of special techniques such as isotope dilution analysis. Of considerable interest also is the description of Carbon-14 dating.

The lecturer closes with a strong statement regarding the need for scientists and the importance of good scientific training in schools. This film was designed for a high school senior-level chemistry or physics course, or as an introductory unit in nuclear science at the college level, and is presented by Dr. Ralph T. Overman, former Chairman, Oak Ridge Institute of Nuclear Studies.

ORDER BY FILM NUMBER AND TITLE

0068
ATOM SMASHERS (Revised 1967). 18 minutes, color.

Suitable for Understanding Level-2.

NOT CLEARED FOR TV.

An introduction to the principles, purposes and methods of particle accelerators (atom smashers) which are used by physicists to study the nature of sub-atomic particles. The film explains: the electron, proton, the neutron; studies of the sub-atomic particles that make up the nucleus; use of the bubble chamber to photograph the "tracks" of sub-atomic particles. The "projectiles" are particles—electrons and protons. The "powder charge" is electromagnetic attraction and repulsion. The "barrels" are circular or linear vacuum tubes. Views are shown of the two-mile long accelerator at Stanford. Explanation is given of circular accelerators: the cyclotron in which "atomic bullets"—exposed to rapidly alternating electrical forces—travel in ever-widening circles, and other accelerators in which the par-

ATOM SMASHERS

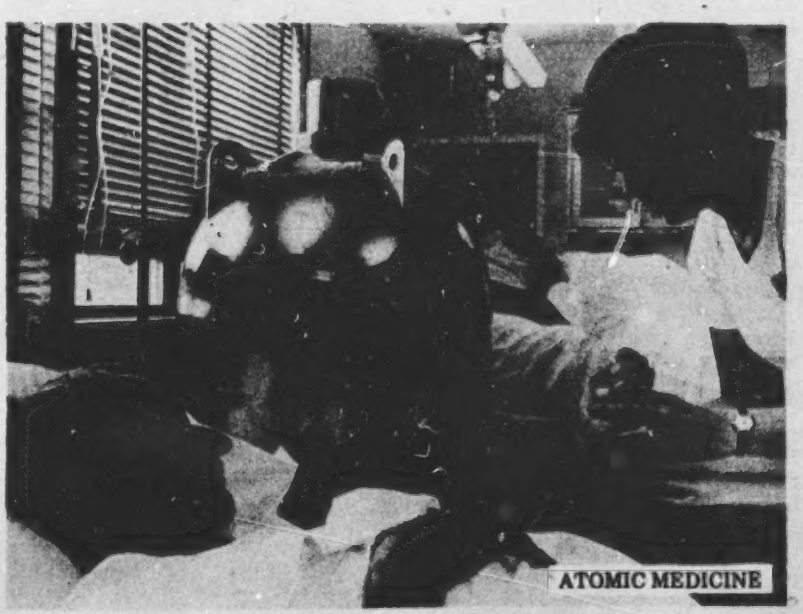
ticles speed around, as on a racetrack, until they almost reach 186,000 miles a second. Views of circular accelerators are shown: the Bevatron, the AGS and the planned 200 Bev.

0039
THE ATOMIC FINGERPRINT (1964). 12½ minutes, color.
Suitable for Understanding Level-2.
NOT CLEARED FOR TV.
Explains neutron activation analysis, a highly sensitive and power analytical technique with wide applications in the basic and applied sciences, which involves the use of neutrons to make substances radioactive, followed by analysis of the radiations emitted, to determine which elements are present and their amounts. The film demonstrates some of the many applications of neutron activation analysis in crime detection, geology and soil science, analysis of art and archeological objects, oil refining, agriculture, electronics, biology and medicine, and space sciences. Various techniques of neutron activation—making a sample radioactive—are explained, as well as the instruments and methods used in analyzing the activated samples. These include the use of the gamma-ray spectrometer and the technique of "spectrum stripping"—the electronic subtraction of the gamma-ray spectra of one or more known elements from that of a multi-element sample.

0040
ATOMIC FURNACES (1962). 29 minutes, black and white.
(From the Challenge Series).
Suitable for Understanding Levels-2 and -3.
CLEARED FOR TV.
The operation, principles, and scientific applications of nuclear reactors, used as research tools in various projects, are briefly described. Types of research that reactors and associated equipment make possible are shown at length. The Gamma Ray Spectrometer, the Neutron Chopper, and a new reactor designed specifically for high- and low-radiation experiments in biology are also described. This film provides an in-depth description of basic research in the nuclear sciences at ERDA's Argonne National Laboratory.

0424
ATOMIC MEDICINE (1968). 27 minutes, color.
Suitable for Understanding Levels-2 and -3.
NOT CLEARED FOR TV.
Makes a summary examination of the expanding applications of atomic energy for the diagnosis and treatment of disease today and in the future, with Host-Narrator Walter Cronkite. Radioisotopes are explained. By using the right radioisotope, doctors can determine the condition of organs, diagnose illness and often treat disease. We see a patient take an "atomic cocktail" (radioactive iodine) which destroys diseased tissue in the thyroid. An example is shown of research on treating leukemia in which the patient's blood is circulated and irradiated outside the patient's body. We see a patient's cancerous pituitary gland being "stabbed" with a needle of radioactive strontium-90, which burns out the cancer.

0046
ATOMIC PHYSICS (1948). 90 minutes (2 reels), black and white.
Suitable for Understanding Levels-2 and -3.
NOT CLEARED FOR TV.
Discusses the history and development of atomic energy, stressing nuclear physics. Dalton's basic atomic theory,


ATOMIC MEDICINE

Faraday's early experiments in electrolysis, Mendeleev's periodic table, and early concepts and size of atoms and molecules are discussed also. The film demonstrates how cathode rays were investigated and how the electron was discovered; how the nature of positive rays was established; how X rays were found and put to use. The film also presents research tools of nuclear physics, explains work of Joliot-Curie and Chadwick in discovery of neutron, and splitting of lithium atom by Cockcroft and Walton. Einstein tells how their work illustrates his theory of equivalence of mass and energy. One sees and hears such famous scientists as J. J. Thomson, Ernest Rutherford, J. D. Cockcroft and O. R. Frisch. Uranium fission is explained, as well as why it is possible to make an atomic bomb.

0050
ATOMIC POWER PRODUCTION (1964). 14 minutes, color.

Suitable for Understanding Level-2.

NOT CLEARED FOR TV.

Opening with an explanation of the growing demand for electrical power, produced today primarily through hydro-electric means and the burning of fossil fuels (coal, gas, and oil), the film tells of the need for harnessing nuclear energy. With animation, an explanation is given of how the heat created by the controlled chain reaction of atomic fuel in a reactor is converted to electrical power. Several types of power reactors and their basic differences are discussed: the boiling water reactor, the pressurized water reactor, one using a liquid sodium coolant, and one using an organic coolant. The principle of the "breeder" reactor is explained and its importance stressed. The film also discusses the care and safety of design, construction, maintenance and operation of atomic power plants.

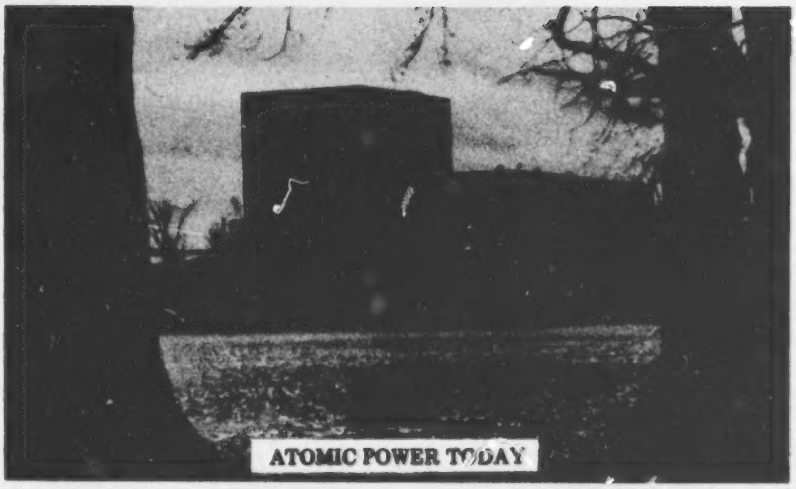
0410
ATOMIC POWER TODAY (Short Version, 1967). 15 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

The motion picture explains the growing need for electricity, contrasts conventional and nuclear generating technology, shows how a nuclear power plant is designed, built and operated for dependable service; describes the many safeguards, and explains the former USAEC regulatory and licensing procedures.

The motion picture tells the story of central station atomic power plants and how they serve the country now and in the future. Starting with how electricity is produced from water power and fossil fuels, the film introduces atomic fuel as a vast new energy resource. The film shows atomic fuel being fabricated and put to work in a nuclear reactor to produce heat which will ultimately produce electricity.



This abridged version of ATOMIC POWER TODAY: SERVICE WITH SAFETY (described below) was made especially for meetings, lectures and groups that require short films only.

0051
ATOMIC POWER TODAY: SERVICE WITH SAFETY (1966). 28½ minutes, color.

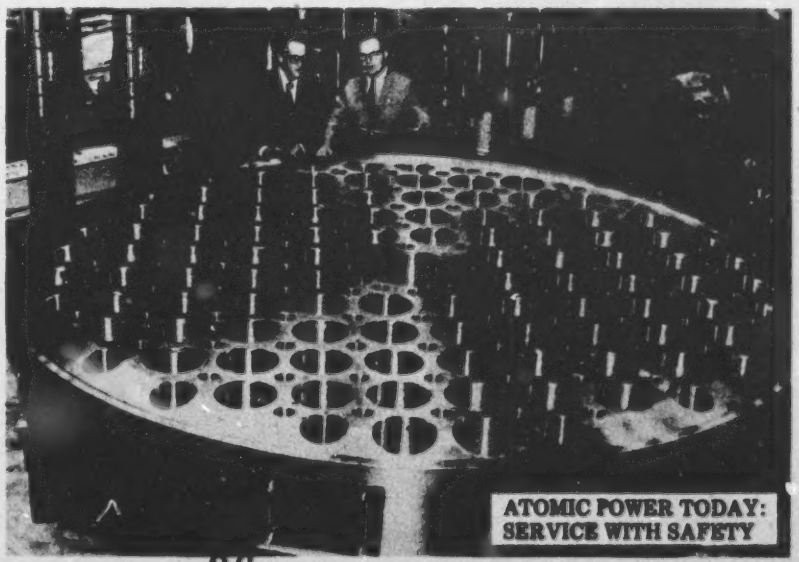
Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Tells the story of central station atomic power plants and how they serve the country now and will continue to do so in the future. Starting with basic information of how electricity is produced from water power and fossil fuels such as oil, gas and coal, the film introduces atomic fuel as a vast new energy resource that helps keep down the cost of electricity. The film shows atomic fuel being fabricated and, through animation, how it is put to work in a nuclear reactor to produce heat which will ultimately be used to produce electricity.

The safety aspects of atomic power, including both natural and engineered safeguards, as well as the demand for dependability by the operating utility and by the customer, are discussed. We see utility and former USAEC conferences relating to a proposed atomic power plant and the care that goes into design and planning.

Further safety considerations are explored, showing some of the rele-

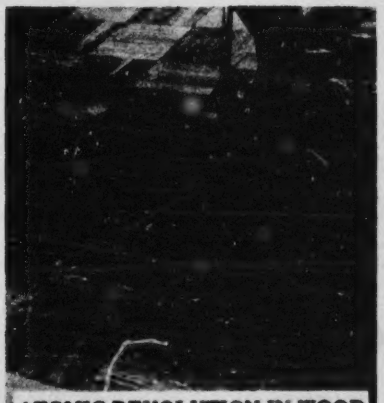


vant equipment and systems. We learn why it is impossible for a nuclear reactor to blow up like an atomic bomb. The film also deals with the safe handling of wastes and controlled release of material to the environment on a planned basis, according to Federal safety regulations.

When the plant finally goes "on the line" it joins other atomic power plants across the nation providing dependable electricity for our many needs. We see a sampling of these plants and the communities they serve, demonstrating that atomic power is here today, providing for our present and future electrical power needs.

HONORS: 10th CINE Golden Eagle International Award, Washington, D. C.; One of the "Most Honored Pictures of the Year," Business Screen, Chicago; 4th International Festival of Scientific & Technical Films, Brussels, Belgium; 10th Gold Mercury Film Prize, Venice, Italy; 14th International Nuclear Congress, Rome, Italy; 8th International Industrial Film Festival, Lisbon, Portugal; 5th ANZAAS International Exhibition of Science Films, Australia & New Zealand; 19th International Electronics & Communications Exhibit, Rome, Italy; Electrotechnical Film Exhibition, Budapest, Hungary; International Trade Fair Energy Spectrum, Salonika, Greece.

ORDER BY FILM NUMBER AND TITLE



0438
ATOMIC REVOLUTION IN WOOD (1969). 23 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Story of a new, important peaceful application of nuclear energy—the fusing of wood and plastic by irradiation into an amazing combination-substance which has all the esthetic appeal of wood, but is greatly improved in hardness, abrasion resistance and durability. The film traces the development of radiation processed wood-plastic materials from initial Government development efforts through industry's commercialization activities. By means of animation and live action, the film explains the process for making this new material and describes its superior characteristics and woodworking properties in comparison to plain wood.

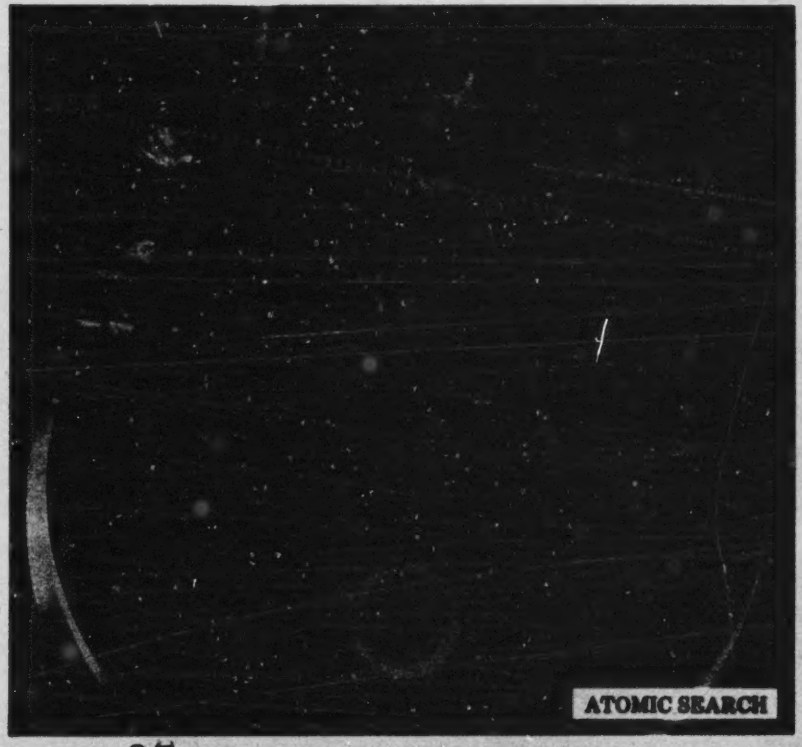
The commercialization activities of several companies actually engaged in the production of wood-plastics are shown, including the actual making of the material. Parquet flooring applications are highlighted, with emphasis on furniture and other industrial uses.

0448
ATOMIC SEARCH (1970). 29 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

In laboratories across the nation, scientists have made continuing important contributions to the peaceful uses of nuclear energy. This film is the story of some of these achievements: nuclear chemistry used to investigate the composition of lunar rocks to help determine the age of the moon; a container of radioactive plutonium to provide heat to protect the seismometer on the moon during the cold lunar nights; an isotopic nuclear generator providing electrical power on weather satellites orbiting in space; the first in a series of tests with dogs of a nuclear-fueled cardiac pacemaker, a device to assist a damaged heart; development of new, highly sensitive diagnostic tools to identify and separate the constituents in the body fluids to predict illness or disease; a special shielded room for low-dose total body irradiation, seeking a more effective, safer method of treating blood disorders; neutron activation analysis to measure the curative powers of a new drug treatment for the Parkinson syndrome, a nerve disorder; development of an irradiated concrete-plastic combination—a corrosion-resistant concrete-polymer four times stronger than ordinary cement; use of a similar irradiated wood-plastic combination, highly resistant to wear, for floors in public buildings and homes; a so-called solar telescope, almost a mile underground, that captures sub-atomic particles from the sun in order to learn more about solar energy; Project Rulison—a 40-kiloton nuclear explosion experiment to shake loose billions of cubic feet of natural gas trapped in hard rock more than 8,000 feet underground; possible identification of a new element, number 104, by a team of scientists at ERDA's Berkeley Laboratory; the work to learn more about effects of an expanding nuclear power industry on the environment—for



example, the effects on fish of the excess heat water from reactor operation—as part of ERDA's conscientious research to protect man and his environment.

HONORS: Electrotechnical Film Exhibition, Budapest, Hungary; 2nd International Scientific Film Festival, Rio de Janeiro, Brazil; 8th International Science Fiction Film Festival, Trieste, Italy; National Youth Conference on the Atom, Chicago, Illinois; Industrial College of the Armed Forces, National Security Seminar, 7 U. S. cities; 17th International Nuclear Congress, Rome, Italy; 12th International Festival of Documentary Films, Bilbao, Spain; 15th International Festival of Scientific and Educational Films, Padua, Italy.

0066
ATOMS FOR THE AMERICAS (1963). 28 minutes, color.
Suitable for Understanding Levels-2 and -3.
CLEARED FOR TV.
Offers an extensive tour of the facilities of the Puerto Rico Nuclear Center (operated for ERDA by the University of Puerto Rico) and a study of the Center's curricula and research programs. The Center was conceived primarily to aid the Latin American nations in developing skills essential to nuclear energy activity, by providing graduate- and post-graduate-level education and research opportunities. At the Center's Bio-Medical building, work is shown involving radioisotopes and their clinical applications, and other nuclear work related to biology, chemistry, and medicine is reviewed. Study and research in nuclear engineering and technology, health physics, agriculture and marine biology are shown at the Center's reactor and laboratories located on the campus of the University of Puerto Rico's College of Agriculture and Engineering, and aboard the Center's oceanographic ship.

ORDER BY FILM NUMBER AND TITLE

0437
ATOMS IN AGRICULTURE (1969). 26 minutes, color.
Suitable for Understanding Levels-2 and -3.
CLEARED FOR TV.
Explores the beneficial applications of atomic energy in the fields of agriculture: as radioactive tracers that—like little radio transmitters—help scientists follow the life processes in plants, animals and soil, and as radiation to treat or improve plants, animals, insects and food products. In a series of interviews at universities, industrial organizations and government research and experiment stations in eight places in the United States, we meet agronomists, veterinarians, entomologists, nutritionists, biochemists and engineers, who show us and explain their work in: the safe and more effective use of pesticides; controlling and understanding the diseases and metabolism of plants and animals; conservation of water; work to fight the staggering crop losses due to weeds, diseases and insects; research to achieve better, higher-yielding crops; studies of animal parasites; studies of cattle feeding; work to eliminate the screwworm fly by irradiation-sterilization; and research on fibers for improved textiles. It is made clear that the atom is an extremely important tool for agricultural scientists.

0418
ATOMS IN THE MARKETPLACE: NUCLEAR MATERIALS SAFEGUARDS AND MANAGEMENT (1988). 28 minutes, color.
Suitable for Understanding Levels-2 and -3.
CLEARED FOR TV.
Deals with the economic nature and significance of high cost, strategic nuclear materials—with their importance to commerce, the nation and the nations of the world.

The film discusses the great need for safeguards and controls to avoid the diversion of uranium, plutonium and other nuclear materials into channels for the making of unauthorized nuclear weapons. In addition, as the young, dynamic nuclear industry grows, it will eventually assume ownership of all commercial nuclear materials and cannot risk small cumulative, undetected losses and the resultant serious financial problems. The film details how the U. S. manages nuclear materials and the special techniques and methods involved—practices established by the U. S. Energy, Research and Development Administration, by private industry, by nations throughout the world, and international organizations—a story that demonstrates the interrelationship of sound management and nuclear safeguards in the atomic age.

0074
BASIC PRINCIPLES OF POWER REACTORS (1962). 8½ minutes, color.
Suitable for Understanding Levels-2 and -3.
CLEARED FOR TV.
This animated film, produced to facilitate the understanding of nuclear-power reactors and how they produce steam for the generation of electricity,

briefly describes fission, controlled chain reaction, and the function of basic reactor components (e.g., core, reactor vessel, shielding, moderators, coolants, and control rods). The boiling-water and pressurized-water reactor concepts are explained. Various types of fuel elements are described, such as rods, plates, and pellets.

0414
A BEGINNING WITHOUT END (1968). 30 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Summary of the wide variety of nuclear research and development work at the Berkeley and Livermore sites of ERDA's Lawrence Radiation Laboratory, operated by the University of California. The film briefly covers, in turn: the work of the late Dr. Ernest Lawrence on the invention and development of the cyclotron (particle accelerators); a historical statement by Dr. Lawrence on the principles of the cyclotron; the post-war work using particle accelerators to discover new elements; research into photosynthesis; use of high-energy particles from an accelerator for medical therapy; studies in superconductivity—the transmission of electricity with no production of heat; studies of chemical processes that occur during a nuclear explosion; work on the Plowshare program; studies of effects of radiation on animals, man and the food cycle of both; developments in the Sherwood program—development of controlled thermonuclear process for useful energy; high energy physics work with the Bevatron.

HONORS: Two Statuettes, Industrial Photography; Special Trophy, Industrial Management Film Festival.

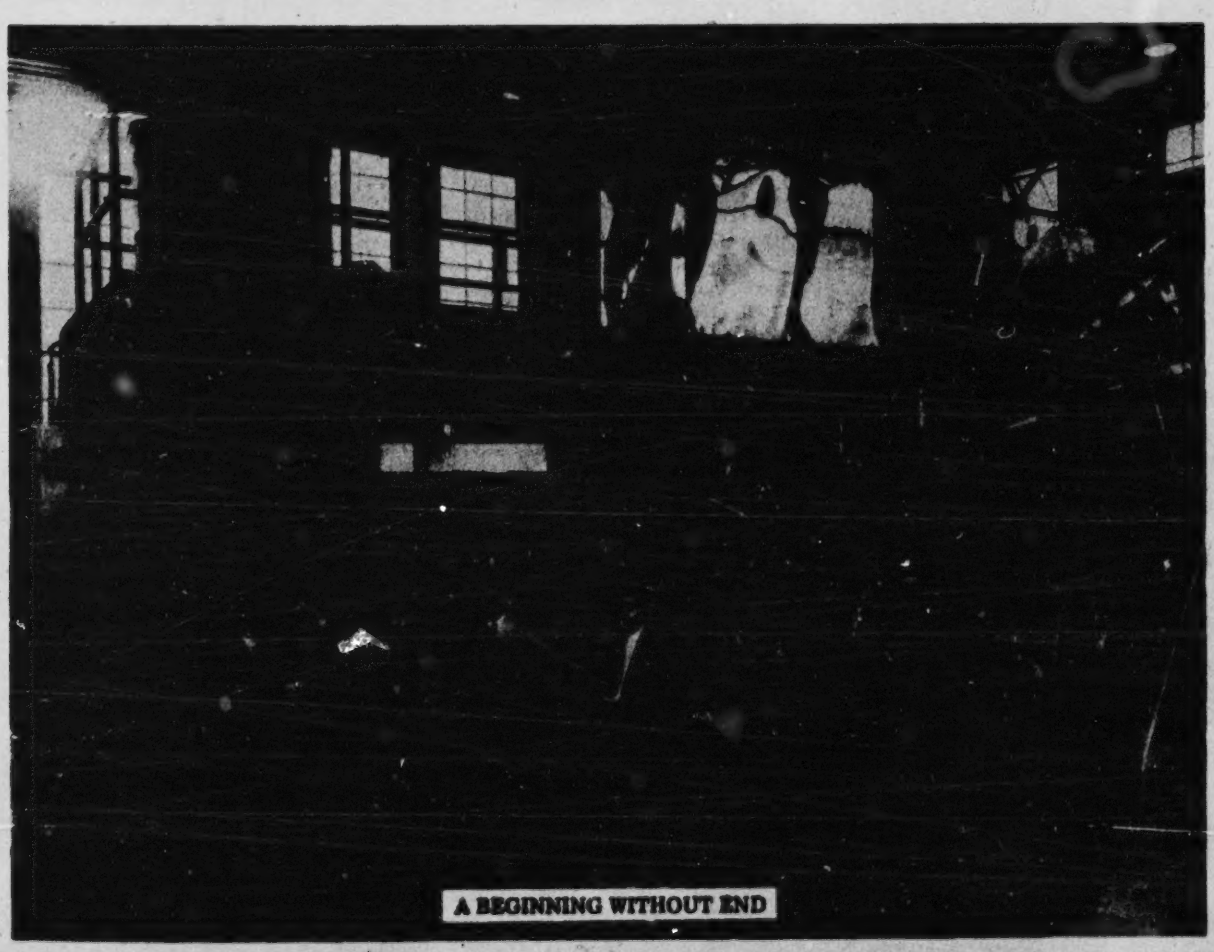
0489
THE BIOENGINEERS (1973). 14 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

In a fast-paced, popular-level, contemporary style, this artistic film explores the exciting new combination of biology and engineering at the Holifield National Laboratory, with special emphasis on the investigation of human cells. Multi-disciplinary teams of scientists and engineers have combined their talents to produce new research and diagnostic tools to aid in the study of molecular biology, and to help gain information that will aid in the relief of suffering and the control of disease. The film surveys the successful development of the zonal centrifuge which has proved useful in purifying flu vaccines. Developed by Dr. Norman Anderson, this high-speed centrifuge has also proven to be a valuable tool in cancer and other biomedical research. To match the speed and efficiency of the centrifuges, an automated clinical analyzer was developed by Anderson's team. Now produced by several companies, this fast analyzer is being used in both the United States and Europe.

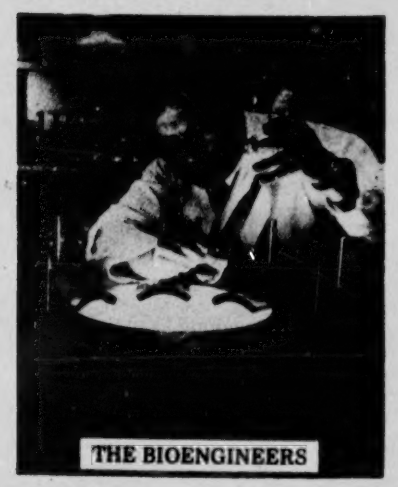
The film also deals with the development of sophisticated machinery to analyze body fluids. From one urine sample the analyzer has given researchers information on more than 100 different molecular components that are often disease-related. This analyzer, developed under the guidance of



Dr. Charles Scott and now in use at several medical centers, will be useful in detecting metabolic abnormalities that might result in early death or mental retardation.

Under the direction of Dr. T. A. Welton and Robert Worsham, a powerful scanning electron microscope is being developed at the laboratory, designed to permit scientists to "see" individual atoms in complex molecules. In addition, this film covers part of the research of Dr. David Novelli and his team as they accomplish the difficult work of separating tRNA from cells. This purified tRNA has been made available to the worldwide scientific community for biochemical research. Basic research, based on the study of tRNA, promises to give us a better understanding of the normal and abnormal functions of human cells.

HONORS: 6th Annual Industrial Film Festival, Chicago, Illinois; Special Prize Cup awarded by Ministry of Industry and Commerce, 5th International Review of Educational TV Films, Rome, Italy; 7th International Review of Didactic Films, Rome, Italy; 12th ANZAAS International Scientific Film Exhibition, Australia and New Zealand; 6th International Scientific Film Festival, Rio de Janeiro; 23rd Festival of Mountain and Exploration Films, Trento, Italy.



THE BIOENGINEERS

0463

THE BITTER AND THE SWEET (1971). 29½ minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

In the world today there are more than 700 small capacity desalting plants which produce about 350 million gallons of freshwater every day. All of these plants use conventional sources of power such as coal, oil or gas to drive their conversion systems. If Man is to meet the growing demand for more and more desalted water, he must eventually turn to nuclear energy as his cheapest source of power.

All aspects of desalting technology are discussed in this film, as well as a capsule report on the status of commercial desalting in the Western Hemisphere. The film blueprints the Agro-Industrial Complex idea and endorses the belief that the technologies of desalting and nuclear energy must converge, if Man is to turn back the threatening growth of world poverty and starvation.

HONORS: 9th ANZAAS International Scientific Film Exhibition (Association for the Advancement of Science), Australia and New Zealand; Chris Award, 19th Columbus Film Festival, Columbus, Ohio.

0081

A BREEDER IN THE DESERT (1965). 29 minutes, black and white.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Argonne's Experimental Breeder Reactor II at the National Reactor Testing Station in Idaho is shown in detail, and many of the features and operating characteristics of a large-scale fast breeder reactor are described. The EBR-II Fuel Cycle Facility, first nuclear fuel reprocessing plant completely integrated with a reactor, is shown in operation.

0083

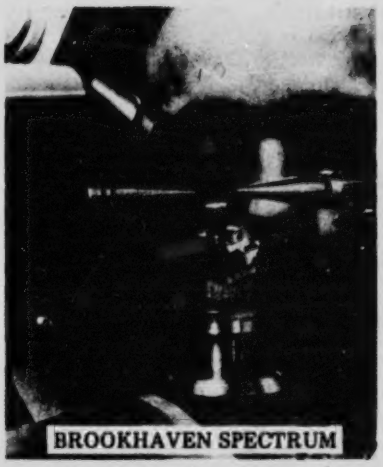
BROOKHAVEN SPECTRUM (1967). 25 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Surveys some of the varied aspects of nuclear research and engineering at the Brookhaven National Laboratory. Scientists and technicians are seen conducting experiments in biology, chemistry, medicine, physics and reactor technology. The use and operation of such large and complex facilities as reactors and accelerators are shown in studying the fundamental structure of matter and the forces within the atomic nucleus. Yet in spite of the impressive size and complexity of their tools, the film concentrates upon the men and women themselves who are the most vital component of any scientific investigation.

Among the research projects reviewed: preservation of perishable foods with high intensity radiation; autoradiography of rare oil paintings by neutron activation; studies with radiation on the mechanisms of aging;



BROOKHAVEN SPECTRUM

an experiment, in cooperation with NASA, on the combined effects of weightlessness and radiation on living organisms in outer space; a newly developed treatment for leukemic patients by extracorporeal irradiation of the blood; an experiment at the 33-Bev AGS resulting in the discovery of an important subnuclear particle; and the use of neutron spectrometers at the High Flux Beam Research Reactor in studying the structure of liquids and solids.

The film suggests the many lines of research that lie ahead. While the primary aim of such research, basic in itself, is to add to man's knowledge of his physical world, it is eventually applied to his benefit in a more direct sense.

HONORS: EFLA American Film Festival, New York City, N. Y.; 10th CINE Golden Eagle International Award, Washington, D. C.; Special Merit, 6th International Labour & Industrial Film Triennial, Antwerp, Belgium; 4th International Exhibition of the Scientific Film, São Paulo, Brazil; 5th International Festival of Scientific & Technical Films, Buenos Aires, Argentina; Trieste Festival of Films, Italy; Scientific Film Festival, Lyon, France; 12th International Festival of Scientific and Educational Films, Padua, Italy; 10th Gold Mercury Film Prize, Venice, Italy; 18th International Exhibition of the Documentary Film, Venice, Italy; 9th International Documentary Festival, Bilbao, Spain; 13th International Congress, Rome, Italy; Award of Merit, 15th Annual Columbus Film Festival, Ohio; 5th International Festival of Scientific Films, Paris, France; one of the "Most Honored Pictures of the Year," Business Screen, Chicago; AAAS (American Association for the Advancement of Science) Convention; Citation, 5th Festival of Technical Films, Budapest, Hungary.

0495
BUILDING AN ATOMIC ACCELERATOR (1973). 28 minutes, color.
Suitable for Understanding Levels-2 and -3.
CLEARED FOR TV.
This film was designed primarily to communicate to both professional scientists and high school science students. The five basic parts of the atomic accelerator (the Super Heavy Ion Linear Accelerator—SuperHILAC) are described: The injectors, the linear accelerator, the radiofrequency power supply, the vacuum system and the magnets. Some of the more important and interesting construction details are shown and explained. Animation is used to aid in explaining the theory of how accelerators work, and how parts of the accelerator function. The film concludes by describing some of the first research performed on this new machine.

The SuperHILAC is unique in this country, for it is the only operational machine designed to accelerate charged atoms of the heaviest natural elements. This makes possible new research: discovery of new elements, cancer research, and many other studies to further our understanding of nature's most fundamental building blocks.

0084
BUILDING BLOCKS OF LIFE (1962). 29 minutes, black and white.
(From the Challenge Series).
Suitable for Understanding Levels-2 and -3.
CLEARED FOR TV.
Unique fragments of molecules caused by radiation in living systems, which are known as free radicals, either kill or seriously damage living cells. The how and why of both the particles and the damage they cause is the topic of this film. The film provides an in-depth description of basic research in the nuclear sciences at ERDA's Argonne National Laboratory.

ORDER BY FILM NUMBER AND TITLE

0508
CHALLENGE OF THE FUTURE (1975). 29 minutes, color.
Suitable for Understanding Levels -2 and -3.
CLEARED FOR TV.
We are entering a new age when energy will be more expensive and less abundant. Our civilization has run on petroleum, oil and gas which has supplied three-quarters of the energy that fuels our society . . . our homes, businesses and industry. Now these resources in

the U. S. are fast running out—America and the nations of the world face a serious and increasing energy problem. To maintain our way of life, we must develop new energy sources for the future . . . perhaps the greatest challenge in our history. It is the Challenge of the Future.

This film looks at the problem and details the options that face the Nation. Now that petroleum is no longer cheap and supplies diminishing, we must shift to other forms of energy. In the past, such changes in technology as from coal to oil took 60 years . . . we no longer have that much time.

Also, this is the story of the recently created U. S. Energy Research and Development Administration (ERDA), the agency that has been charged by Congress to meet the energy needs of present and future generations. The film looks at the full range of energy options . . . from near-term conversion from coal to synthetic coal and gas, increased use of nuclear power and energy conservation to prevent waste and increase efficiency . . . to mid-term research in solar energy, geothermal energy and breeder reactors and then looks beyond the year 2000 to the work being done today in controlled thermonuclear research, laser fusion and solar electricity. The film visits the ERDA laboratories and pilot plants in most of the energy research and development centers across the land where work in these major categories functions are carried out: solar, geothermal and advanced energy systems; nuclear energy, energy conservation; environment and safety.

0089
A CHEMICAL SOMERSAULT (1965). 29 minutes, black and white.
(From the Challenge Series).

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

A commonly accepted scientific maxim, that the inert gases will not form chemical compounds, is shown to be false in this film depicting some of the research of the ERDA Argonne National Laboratory fluorine chemistry group. The making of xenon-fluorine compounds is illustrated with laboratory equipment. Research into structures of molecules of these compounds is shown and explained. This film provides an in-depth description of basic research in the nuclear sciences at the national laboratory.

0092

CLEAN AIR IS A BREEZE: Airborne Contamination Control Through Laminar Air Flow (1965). 16 minutes, color.

Suitable for Understanding Levels-2 and 3.

CLEARED FOR TV.

Common sources of airborne contamination are illustrated to show that our world is contaminated by a variety of airborne particles. The difficulties of manufacturing precision devices in such a "dirty" world are shown. The tiny sizes of particles which cause problems in delicate assembly work and critical industrial processes are illustrated through animated photography. Earlier attempts to clean air for industrial processes by means of clean rooms are shown. The reasons for less than complete success with standard clean rooms are explained through animation, and the theory and basic operating principles of laminar airflow systems are shown. The variety of laminar airflow devices (various clean rooms and clean benches) now available is shown. Application of such devices to industrial processes, research and development problems, and to the field of medical care and medical research are illustrated.

0433

COMBUSTION TECHNIQUES IN LIQUID SCINTILLATION COUNTING (1969). 25 minutes, color.

Suitable for Understanding Level-3.

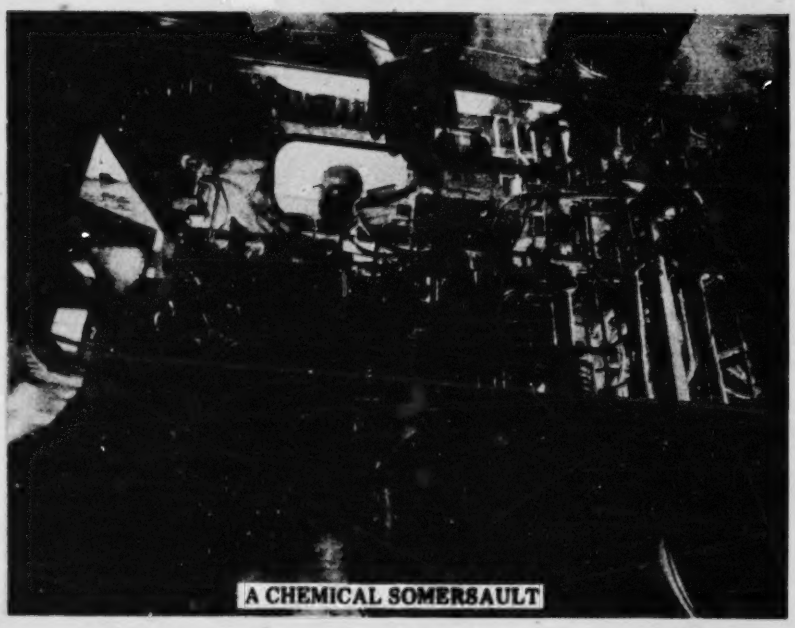
CLEARED FOR TV.

The scientific discipline of molecular biology has emerged to dominate the life sciences and open up the new frontiers of biophysics and biochemical research at the molecular and submolecular levels.

The belief that structure and function of the cell can be integrated had led technology to the development of more sophisticated research tools such as electron microscopy, autoradiography, ultra-centrifugation, chromatographic methods, and liquid scintillation counting.

A new refined combustion technique in liquid scintillation counting has been developed at ERDA's Argonne National Laboratory, which combines the simplicity of dry catalytic combustion with the increased efficiency of standard vacuum line techniques. The new technique enables the biologist to prepare and measure very low beta energies in large numbers of biological samples.

HONORS: CINE Golden Eagle International Award, Washington, D. C.; Lyon Scientific Film Festival, France; Trieste Science Fiction Film Festival, Italy; 14th International Exhibition of Scientific and Educational Films, Padua, Italy; Gold Camera Winner, Industrial Film Festival, Chicago, Illinois.



A CHEMICAL SOMERSAULT

0485

COMPUTER COLOR GENERATIONS (1972). 23 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

One of the problems associated with high-speed digital computers has been in displaying the output in a manner that will allow both quick and comprehensive analysis. The obvious answer has been film, in both 16mm computer film and 35mm stills. Through the use of film output, the scientist has been able to determine in a short period of time the progress of any computer run. However, as computers increased in speed and became capable of highly sophisticated simulations, the large amount of information required per frame could not be displayed in a reasonable manner. The use of color film could solve this problem but was too expensive in computer time to consider. "Computer Color Generations" discusses a technique developed at ERDA's Los Alamos Scientific Laboratory that produces color film from the computer without any increase in computer time over an equivalent black and white run. Because more information is possible per frame, the overall expense will drop significantly. Various areas of LASL research, which use computer color film output, are discussed and results illustrated. Included are such areas of research as Controlled Thermonuclear Research, Engineering, Lasers, and three dimensional space problems.

HONORS: 14th Industrial Photography Awards, Chicago, 6th International Festival of Scientific and Technical Films, Brussels; 17th International Festival of Scientific and Educational Films, University of Padua, Padua, Italy; 5th International Scientific Film Festival, Rio de Janeiro, Brazil; First Prize Cup and Diploma of Merit, 20th International Exhibition of Specialized Cinematography ("Nuclear Rassegna"), Rome, Italy; Awarded cash prize 100 Liva ($61 equivalent), 5th International Film Festival on Organization and Automation of Production and Management, Sofia, Bulgaria; 11th International Science Fiction Film Festival, Trieste, Italy; Golden Eagle Certificate, CINE 16th Annual Awards Presentation Ceremonies and Exhibi-

tion of Films of Merit, Washington, D. C.; Venice Golden Mercury Film Festival, Venice, Italy.

0436
COMPUTER FLUID DYNAMICS (1969). 24 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Demonstrates the power of giant electronic computers for solving problems that previously were impractical to undertake. The examples cover a wide range of fluid flow problems; for example, the water wave produced when a sluice gate is opened. First, it presents the actual laboratory experiment in slow motion; then, for comparison, it shows the unretouched output of an electronic computer study of the same process, so that the viewer can see for himself how accurately the motion has been calculated.

HONORS: Science Film Theater, American Association for the Advancement of Science, Boston; 12th Annual Information Film Producers of America, San Diego, Calif.

0459
CONTROLLED PHOTOSYNTHESIS (1971). 24 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Photosynthesis is probably the most important chemical reaction that takes place on earth—for without it there would be no plants, no animals, no life. The film gives an introduction to the structure of leaves, chloroplasts, grana and lamellae; and describes the first part of the process of converting the sun's energy to chemical energy.

The film describes the injection of radioactive carbon-14 into the plant, and tells how this tracer technique is used to determine the series of chemical compounds the plant makes before producing food sugars and also describes some current research on enzyme reactions in plants. It is known that enzymes influence the production of carbohydrates, proteins and fats. It appears possible, by controlling these enzymes, to control photosynthesis and increase the production of protein in the plant's leaves.

Featured is a brief discussion by Dr. Melvin Calvin, Lawrence Berkeley Laboratory, who was awarded a Nobel Prize in 1961 for his research with radioactive tracers on the transformation of raw chemicals into plant sugars.

HONORS: Finalist, National Educational Film Festival, Oakland, California; Special Award, 13th Annual Industrial Film Awards, New York, N. Y.; American Society for Microbiology, Philadelphia, Pa.

ORDER BY FILM NUMBER AND TITLE

0096
CONTROLLING ATOMIC ENERGY (1961). 13½ minutes, color.

Suitable for Understanding Level-2.

NOT CLEARED FOR TV.

A basic teaching film (which uses the conversation of a young student and a scientist who is writing a book about atomic energy) summarizing, briefly, by live action and animation, the following: what is an atom; radioactive atoms; measuring radioactivity; uranium; nuclear fission; the chain reaction; the controlled chain reaction in reactors; how reactors are used for production of electricity for power and propulsion; and the production of radioisotopes for applications in biology, medical diagnosis and therapy, agriculture, industry, and research.

HONORS: 11th CINE Golden Eagle International Award, Washington, D. C.; Blue Ribbon, EFLA, New York City, N. Y.; 10th American Film Festival, New York City, N. Y.; Columbus Film Festival, Ohio; 21st Edinburgh Film Festival, Scotland; Trieste Festival of Science Films, Italy; 3rd International Festival of Experimental & Documentary Films, Cordoba, Spain; 21st International Film Festival, Salerno, Italy; Science, Fact and Fantasy Film Event, Newcastle-Upon-Tyne, United Kingdom; 13th International Festival of Scientific & Educational Films, Padua, Italy; ANZAAS, Australia & New Zealand; 6th International Exhibition of the Scientific Film, Buenos Aires, Argentina.

0097
CONTROLLING RECORDS FIRES WITH HIGH EXPANSION FOAM (1966). 13 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Simplified description of high-expansion foam and its characteristics as a fire-fighting agent, particularly with respect to fires involving paper and photographic records in typical open file storage.

The film summarizes the result of high-expansion foam tests conducted at the National Reactor Testing Station in August 1965. The tests disclosed that high-expansion foam provides fast, effective, and possibly least damaging means of extinguishing fires involving various kinds of records, including x-ray films, motion picture films and photographic prints.

Special problems encountered in using the foam are dealt with in the film, together with various means of coping with such fires.

The film concludes with the test findings that certain types of records, containers, labeling methods and storage arrangements are superior to others in minimizing damage from both fires and extinguishing agents.

HONORS: ANZAAS International Scientific Film Exhibition, Australia & New Zealand; 14th International Electronic & Nuclear Congress, Rome, Italy; 19th International Electronics and Communications Exhibit, Rome, Italy.

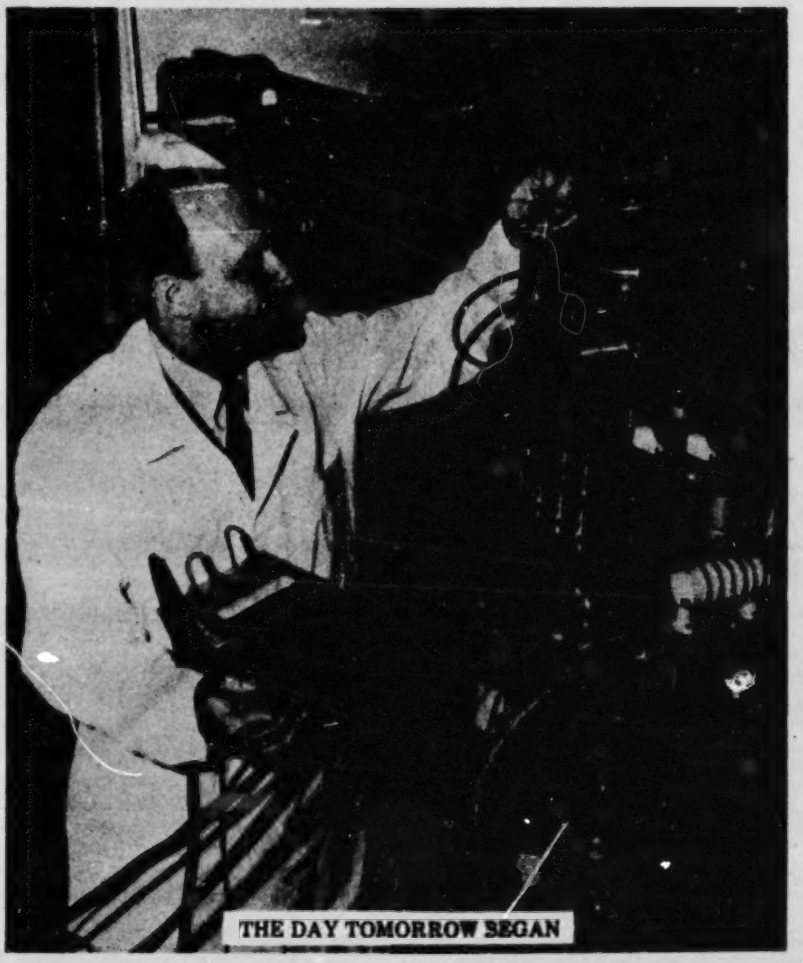
0100
CURRENT METHODS IN PLUTONIUM FUEL FABRICATION (1965). 30 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

Depicts the steps in the fabrication of plutonium—uranium ceramic fuel elements for the PRTR and EBWR at Hanford's Plutonium Fabrication Pilot Plant. Presented are the various types of elements fabricated, the methods for routine handling of plutonium and plutonium compounds, the preparation of plutonium dioxide from the metal, and its mixture with uranium dioxide. The necessity for densifying the powdered fuel is explained, and the steps involved in achieving high density particles by pneumatic impaction are illustrated in detail. Processes shown include pressing of the dense fuel from the impaction container, pulverizing, sieving into different size fractions, and blending into appropriate proportions for fuel rod fabrication either by vibrational compaction or swaging. A newer process, vibrational compaction, accomplishes similar results. The process is depicted in a live sequence which illustrates its ra-

pidity, simplicity, and flexibility. Decontamination of loaded fuel rods and welding of the final end caps are followed by several unconventional testing techniques before assembly of the rods into the nineteen-rod nuclear fuel element cluster.


THE DAY TOMORROW BEGAN

0413
THE DAY TOMORROW BEGAN (1967). 30¼ minutes, color.

Suitable for Understanding Levels-2 and -3.

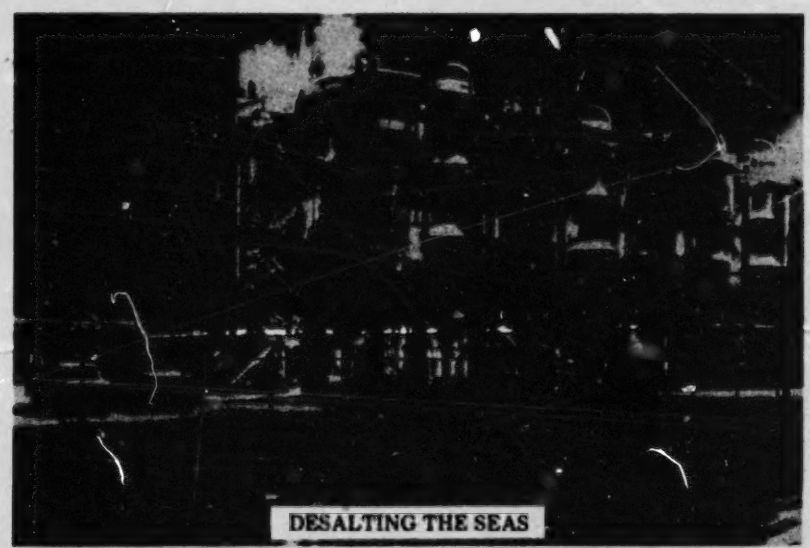
CLEARED FOR TV.

This historical film tells the story of the building and testing of CP-1 (Chicago Pile-1), the first atomic pile, and the work of the brilliant scientific team, led by Dr. Enrico Fermi, which ushered in the Atomic Age behind a cloak of wartime security under the stands of Stagg Field, Chicago, December 2, 1942.

By interview, historical footage, paintings, etc., the film takes us on a step-by-step re-enactment of the famous event—beginning with the arrival of the first refugee scientists in 1939, to the dramatic hours in late 1942 when control rods were pulled out of CP-1 an inch at a time, to achieve the first sustained chain reaction.

Interviews are conducted with some of the members of the team and people closely associated with them—John Wheeler, Mrs. Laura Fermi, Glenn Seaborg, Leslie Groves, Frank Spedding, Crawford Greenwalt, Walter Zinn, Herbert Anderson, Norman Hilberry and Mrs. Leona Libby.

Against the background of a world plunged into World War II, the Third Reich hard on its way to developing an atomic bomb, uranium metal almost a laboratory curiosity, and with seemingly unsurmountable problems to be solved—the story of this brilliant scientific tour-de-force brings into focus the work of such people as Dr. Fermi, Leo Szilard, James Conant, Vannevar Bush, Arthur Compton, Ernest Lawrence and others.


DESALTING THE SEAS

0407
DESALTING THE SEAS (1967). 17 minutes, color.

Suitable for Understanding Levels-2 and 3.

CLEARED FOR TV.

Describes the various methods of purifying saline waters through the use of nuclear energy, with particular emphasis on large-scale dual purpose nuclear-electric desalting plants which will not only purify water but will also produce large amounts of electric power simultaneously. The film deals with, in turn: the growing shortage of water in a famine-threatened world of expanding population; the various methods of desalting sea water—the crystallization or freezing process, the membrane or squeezing process, the distillation or boiling process; an explanation of nuclear energy as a means of desalting large quantities of sea water; cost reduction by means of dual-purpose nuclear plants; the problems and goals of nuclear desalting and

the development of plants to advance the technology.

HONORS: Special Mention, 21st Film Festival, Salerno, Italy; 5th International Festival of Scientific and Technical Films, University of Buenos Aires, Argentina; 15th International Nuclear Congress, Rome, Italy, U. S. Trade Center, London, United Kingdom; 5th International Scientific Film Festival, Lyon, France; 12th International Festival of Scientific and Educational Films, Padua, Italy; 5th International Festival of Scientific Films, Paris, France.

0103
DEVELOPMENT AND FABRICATION OF HFIR TARGET ELEMENTS (1967). 14½ minutes, color.
Suitable for Understanding Level-3.
CLEARED FOR TV.
Depicts the design and development of High Flux Isotope Reactor target elements—and the development of suitable manufacturing processes—for the nation's transuranium program. The picture shows the remote manufacture of target elements at Holifield National Laboratory's Transuranium Processing Plant. These elements, after irradiation in HFIR, are returned to TRU and chemically processed for separation of the desired transuranium isotopes. This film demonstrates that highly complex manipulations of radioactive materials can be achieved remotely by the mechanical hands of a hot cell.

0477
DISPERSION THEORY APPROACH TO NUCLEON–NUCLEON SCATTERING (1961). 45 minutes, color.
Suitable for Understanding Level-3.
CLEARED FOR TV.
This filmed technical lecture by Dr. H. Pierre Noyes, which outlines some of the main ideas and techniques used in the calculation of the nucleon–nucleon scattering matrix from its analytic properties and unitarity, is suitable for use at the graduate student-staff level. It presupposes some familiarity with scattering solutions of the nonrelativistic Schroedinger equation and Cauchy's theorem and an acquaintance with Feynman diagrams. Topics discussed: (1) Solution of the S-wave Schroedinger equation for a superposition of exponential or Yukawa potentials by conversion to a Volterra equation, using the method of André Martin. (2) Solution of the same equation by partial-wave-dispersion relations using the N/D method; construction of the potential from the discontinuity in the partial-wave amplitude. (3) The Mandelstam representation for potential scattering and construction of the double-spectral function. (4) Relation between the field–theoretic amplitude and the nonrelativistic scattering amplitude. (5) Relation of nucleon–nucleon scattering to the nucleon–antinucleon amplitude, pion–nucleon scattering, pion–pion scattering, and nucleon electromagnetic structure. (See also ANALYSIS OF NUCLEON–NUCLEON SCATTERING EXPERIMENTS on page 13).

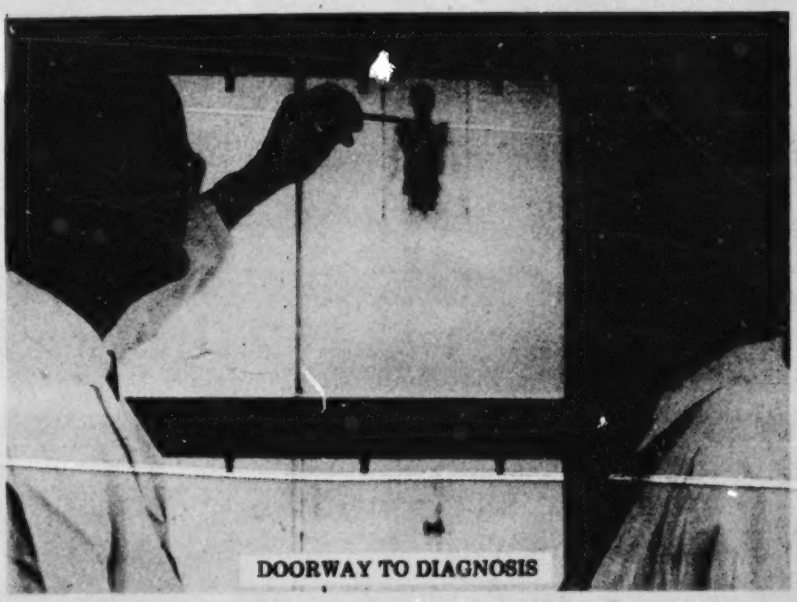
0465
DOORWAY TO DIAGNOSIS (1971). 24¼ minutes, color.
Suitable for Understanding Level-3.
CLEARED FOR TV.
One of the eternal challenges in the field of biological instrumentation has been the ability to detect and accurately measure radiation which occurs when nuclei undergo transitions. Recently some revolutionary improvements in such energy resolution have been made through the development of semiconductor detectors, image intensifiers, new rare earth phosphors and refined scanning devices.

All of these clinical advances have in part been financed by ERDA (formerly AEC), and their improved capability arms the physician with a much more sophisticated ability to detect and accurately measure the various manifestations of disease.

HONORS: 16th International Festival of Scientific and Educational Films, University of Padua, Italy; Diploma Award at 15th Venice Golden Mercury Film Festival, Venice, Italy; 7th International Festival of Scientific and Technical Films, Belgrade, Yugoslavia; 14th Industrial Photography Awards, Chicago, Illinois.

0105
DOWN ON THE FARM (1965). 29 minutes, black and white.
(From the Challenge Series).
Suitable for Understanding Levels-2 and -3.
CLEARED FOR TV.
Algae are grown in heavy water in a unique "farm" at Argonne to obtain organic compounds in which the atoms of ordinary hydrogen are replaced by atoms of deuterium. Scientists show how these deuterated compounds are employed in studies of photosynthesis and other metabolic processes. The presence of deuterium in place of ordinary hydrogen is shown to have a slowing-down effect on many life processes. The film provides an in-depth description of basic research in the nuclear sciences at ERDA's Argonne National Laboratory.

0457
ENDLESS CHAIN (1971). 28 minutes, color.
Suitable for Understanding Levels-1, -2, and -3.
CLEARED FOR TV.
A poetic, intimate look at the "endless chain of life" in the desert: the ceaseless transfer of the sun's energy to plants, to insects, and to animals. We see the life–death cycle, as energy passes from a plant . . . to a beetle . . . a pocket mouse . . . a snake . . . a hawk—and the cycle is completed as bird droppings washed down by rain become nutrients for plants.


DOORWAY TO DIAGNOSIS

ENDLESS CHAIN

But man eventually intrudes, threatening the environment essential to his own existence. Will man and his mishandling of nature end acceptable conditions on earth? To save the environment, one must understand it. Here in Washington State, Project ALE (Arid Lands Ecology) is an ecological study sanctuary set aside by the Energy Research and Development Administration to investigate arid lands representative of two-thirds of the earth's land.

Since the ecology of arid lands offers an ideal opportunity to understand nature's endless chain, a team of scientists from Battelle-Northwest, representing all the varied life sciences, investigate the plants, animals and interacting food chains of the desert. We watch as the scientists search for data, later preserved and stored by computers, with the ultimate objective of achieving guidelines so man can learn to protect the delicate web of life around him and his irreplaceable environment. For a no-narration version of this film see WEB OF LIFE, page 60.

HONORS: 18th International Nuclear Congress, Rome, Italy; Diploma, 1st International Days of Scientific & Didactic Films, University of Madrid, Spain; Festival Finalist, National Educational Film Festival, Oakland, California; Gold Ribbon in Ecology, American Film Festival, New York City, N. Y.; 14th International Golden Mercury Film Prize, Venice, Italy; Second Prize, Silver Medal and Trophy of the Rome Fair, 5th International Review of Didactic Film & 3rd International Review of TV Educational Films, Rome, Italy; 25th Edinburgh International Film Festival, Edinburgh, Scotland; 3rd International Scientific Film Festival, Rio de Janeiro, Brazil; 9th Show of Technical, Scientific & Educational Films in Industry, Pardubice, Czechoslovakia; Golden Eagle, CINE (Council on International Nontheatrical Events), Washington, D. C.; Chris Award in Education, 19th Columbus Film Festival, Columbus, Ohio; 16th International Festival of Scientific & Educational Film, University of Padua, Italy; 9th ANZAAS International Scientific Film Exhibition, Australian & New Zealand Association for the Advancement of Science.

ORDER BY FILM NUMBER AND TITLE

0507
ENERGY—THE AMERICAN EXPERIENCE (1975). 28½ minutes, color.

Suitable for Understanding Levels -1, -2 and -3.

CLEARED FOR TV.

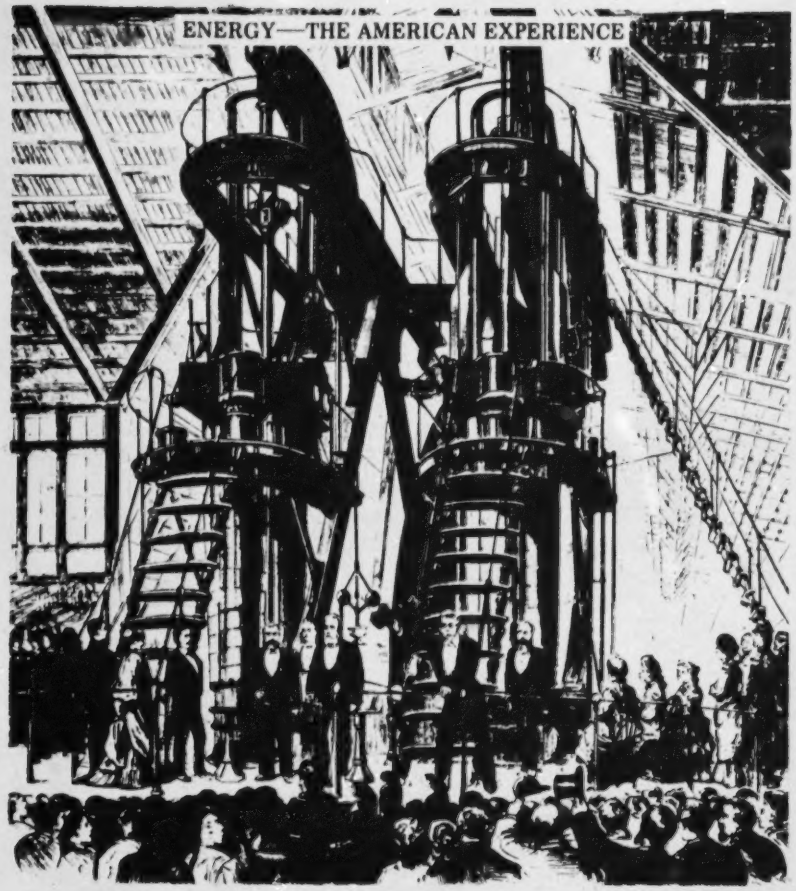
With the perspective over 200 years of history, the film shows the development of different forms of energy under the unique conditions of the American Experience. We see the 60 year changing cycles of energy sources from wood to coal to oil and gas produce the steam and electrical energy that helped make the United States the industrial giant of the world.

Americans of the past worked from dawn to dark to live and improve their lives. They asked the same basic questions from the beginning—in the 18th and 19th centuries—as we are today.

Questions about energy, how to extract it, use it, convert it, and conserve it, are universal—only the answers differ for each historic period.

American inventors and their inventions from water powered mills to the famous reaper bring us to 1876 and the Centennial celebration when the conquest of energy was made by coal, iron and steam. The great event is shown as it was when the giant Corliss steam engine ran all the equipment in machinery hall. Then we see early solar inventions, the internal combustion engine, the horseless carriage, a flying machine, electricity. Along with the mechanical improvements, the film reveals human progress despite wars and depressions.

Then today, the fuels Americans thought inexhaustible are being used up, rapidly. And how to promote a national effort in this emergency, the Energy Research and Development Administration has been created to plan the best use of present resources,



mobilize science and industry to develop new sources and choices of energy.

We see in the National Energy Research and Energy Plan new work in ancient sources: solar, geothermal, wind power; depicted is coal being converted to synthetic gas and oil; oil from oil shale; while work in enhancing oil wells and developing nuclear power plants and breeder reactors goes on. Finally, the film peeks into the future work at fusion and solar electricity—the inexhaustible energy sources of tomorrow

0113
ENVIRONMENTAL TESTING AT SANDIA (1964). 28 minutes, color.
Suitable for Understanding Levels-2 and -3.
CLEARED FOR TV.
Discusses the environments, both natural and induced, which weapon components and systems may experience between manufacture and use. The film shows how environmental testing is used to ensure reliability. A series of test sequences enables the audience to see some of the facilities at ERDA's Sandia Laboratory—giant centrifuge, electrodynamic shaker, rocker sled, air gun and climatic chamber—which are used to produce varying environments.

0117
EXPERIMENTS IN CONTROLLING BRUSH FIRES WITH DETERGENT FOAM (1965). 6½ minutes, color.
Suitable for Understanding Levels-2 and -3.
CLEARED FOR TV.
Grass, brush, and forest fires cause an annual loss in the United States close to a quarter billion dollars. This film describes a series of tests by Argonne National Laboratory to explore the use of detergent foam as a fire break. Experiments were conducted with the Fire Protection Department's forestry jeep, which has a 265-gallon water tank and rotary gear pump. A detergent and water solution is sprayed on a nylon mesh while air is forced through the openings in the mesh by a large fan. This produces a detergent foam which has been expanded approximately 1000 times. The foam is delivered through a canvas tube at the rate of 5000 cubic feet of foam per minute. In three tests detergent foam appeared to be effective.

0431
EXPLORING THE ATOMIC NUCLEUS (1969). 13½ minutes, color.
Suitable for Understanding Levels-2 and -3.
NOT CLEARED FOR TV.
Describes particles accelerators—the basic tools of high energy physics, used to explore the atomic nucleus. The purpose of the film is to show some of the recent discoveries physicists have made concerning nuclear structure, the basic equipment used, and how the resulting data are analyzed. The film shows concepts of atomic structure, how the atomic nucleus is bombarded with other particles, how particle interactions are detected, and the analysis via bubble chamber photographs.

The exploration of the atomic nucleus is one of the frontiers of physics. Using massive particle accelerators, physicists accelerate atomic particles to speeds approaching that of light, and use them to bombard the nuclei of various elements. From the resulting collisions, new particles are created which are directed into detection devices such as scintillation counters, Cherenkov counters, spark chambers and bubble chambers. Analysis of bubble chamber photographs shows how inferences are made regarding the nature of nuclear particle interactions. As scientists study these interactions, and the new particles available for analysis, they modify their ideas as to what the atomic nucleus is like and thus learn more about the basic nature of matter itself.

0119
EXTRACORPOREAL IRRADIATION OF BLOOD AND LYMPH (1966). 7½ minutes, color.
Suitable for Understanding Level-3.
CLEARED FOR TV.
Shows how blood and/or lymph may be irradiated in a well-shielded gamma ray source outside of the body through a closed circuit of teflon tubes from artery to vein. The basic principle concerns the relative radiation resistance of erythrocytes (red blood cells) and the radiation sensitivity of the normal white cells (lymphocytes). The technique developed at ERDA's Brookhaven National Laboratory, known as extracorporeal irradiation, is still experimental. It may prove to be of some therapeutic value to patients with leukemia and severe kidney disease.

Surgeons working in the operating room section of the experimental animal barn are shown fitting a calf with an external loop of teflon linking the carotid artery to a vein. The loop may

be enlarged to include a cobalt-60 or a cesium-137 irradiation source.

A similar method for irradiation of lymph fluid outside the body employs an external plastic loop from thoracic lymphatic organs to a vein. The lymphocytes—an integral part of the foreign tissue rejection mechanism—may be depleted by extracorporeal irradiation, thus interfering with the normal body reaction of rejection of transfused blood, skin grafts, or organ transplants, etc. The final scenes show a human patient with chronic myelocytic leukemia receiving treatment.

HONORS: 5th ANZAAS International Scientific Film Exhibition, Australia & New Zealand; 4th International Festival of Scientific & Technical Films, Brussels, Belgium; 2nd International Festival of Red Cross and Health Films, Varna, Bulgaria.

0124
FABRICATION OF SNAP-7D FUEL SOURCES (1964). 12 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

Semitechnical film which describes the fabrication of strontium-90 fuel capsules for the SNAP-7D generator which powers an unmanned Navy Weather Station in the Gulf of Mexico. Purified strontium-90 carbonate was processed at ORNL's Fission Products Development Laboratory to strontium-90 titanate, pressed into pellets and then encapsulated. Most of the film is devoted to the pelletizing and encapsulating operations within the hot cells of the FPDL.

0478
FABRICATION OF THE ACCELERATOR STRUCTURE (1965). 40 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

Describes the methods used in the fabrication of the accelerating structure and associated components for the ERDA's two-mile linear electron accelerator at Stanford University. The accelerator pipe, or disk-loaded waveguide, through which the electron beam travels, is manufactured from oxygen-free, high-conductivity copper cylinders and disks. The film shows in detail the steps followed in brazing together of 84 cylinders and 85 disks to form a basic 10-foot section of the accelerating structure. Significant steps shown and described include: machining of cylinders and disks; annealing of parts; fabrication of input and output coupler sub-assemblies; brazing of a 10-foot section in a unique, hydrogen—oxygen, split-ring burner flame furnace; of tuning and high power of testing of a section using the full power of a klystron tube; and, the mounting of four 10-foot sections and associated components.

HONORS: 4th ANZAAS International Scientific Film Exhibition, Australia & New Zealand; International Exhibition of the Scientific—Didactic Film, Padua, Italy.

ORDER BY FILM NUMBER AND TITLE

0127
FARM FRESH TO YOU (1966). 13½ minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Preservation of fresh fruits and vegetables by radiation pasteurization is described in this semi-technical film. After touching briefly on the high spoilage losses presently encountered in the marketing of fresh produce, the film presents graphic visual evidence of the reduced spoilage and extension of shelf life which can be obtained through the use of nuclear energy. The process of exposing foods to the energy of the atom in radiation research facilities is described, together with a simple animated version of what happens during exposure. Emphasis is placed on the fact that foods processed in this way are safe for human consumption, and that each radiation pasteurized food item will be approved by the U. S. Food and Drug Administration before it is offered for sale to the public.

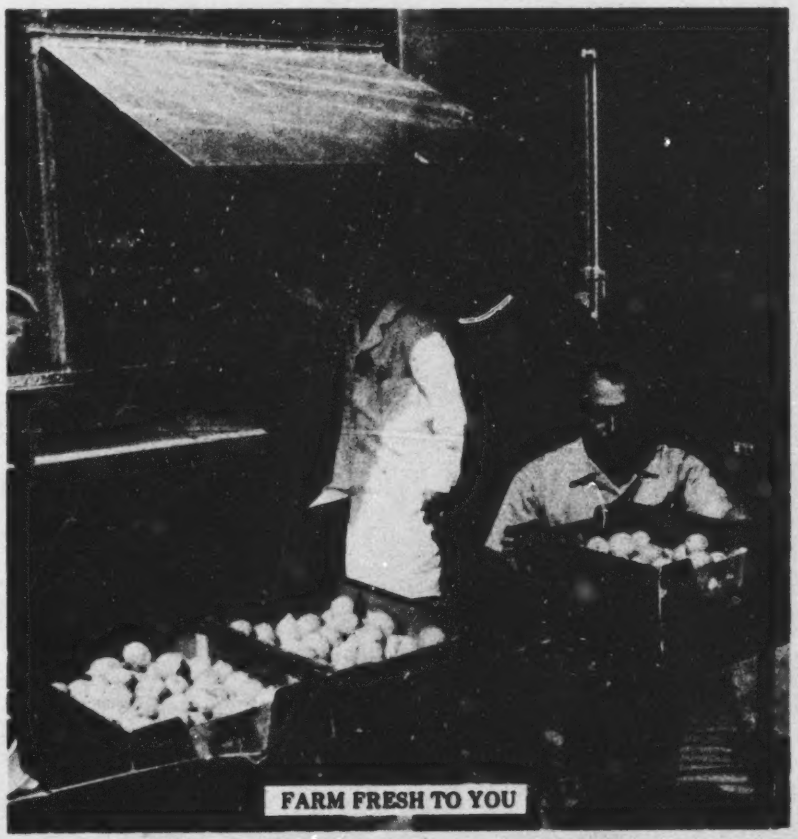
HONORS: 5th ANZAAS International Scientific Film Exhibition, Australia and New Zealand; 5th International Festival of Science Films, Lyon, France; 12th International Festival of Scientific & Educational Films, Padua, Italy; 14th International Nuclear Exposition, Rome, Italy; 5th International Festival of Science Fiction Films, Trieste, Italy; 7th International Agricultural Film Festival, Trieste, Italy; 10th Gold Mercury Film Prize, Venice, Italy.

0455
THE FEAST (1970). 29 minutes, color.

Suitable for Understanding Levels-2 and -3.

NOT CLEARED FOR TV.

This anthropological film, made by enthnographic film-maker Timothy Asch of Brandeis University and anthropologist Napoleon Chagnon of



FARM FRESH TO YOU

THE FEAST also YANOMAMA

the University of Michigan, shows the first stages of alliance formation between two of many mutually hostile Yanomamo Indian villages in Southern Venezuela and Northern Brazil. Through feasting, trading, dancing and chanting, the hosts and their guests, wearing only decorative paint and feathers, hope to renew an old alliance, but both—though surrounded by hostile enemies and desperately needing allies—are fearful because such a feast can end in violence through treachery or flaring of tempers. The story of this impressive documentary is told in a unique fashion: first a brief summary of the events with explanatory narration and still pictures; then a motion picture without narration, recounting in detail the preparation for and holding of the feast, using only the sights and sounds of the event and occasional superimposed translations of the authentic recorded dialogue. This film is one aspect of comprehensive studies of the population genetics of primitive peoples under the overall direction of Prof. James V. Neel, Chairman of the Department of Human Genetics of the University of Michigan, and under the financial sponsorship of the former U. S. Atomic Energy Commission.

HONORS: Golden Eagle, CINE (Council on Nontheatrical Events), Washington, D. C.; 8th New York Film Festival, New York; 19th International Festival of Scientific and Educational Films, Padua, Italy; Grand Prize Trophy, 20th International Tourist and Folklore Film Week, Brussels, Belgium; First Prize, 14th American Film Festival, N. Y., N. Y.; First Place, First International Festival of Sociological and Ethnographic Films, Venice, Italy; Festival dei Popoli, Florence, Italy; Tokyo Film Festival "Festival of Ethnographic Films of the World," Tokyo, Japan; 10th International Educational Film Festival, Teheran, Iran.

0409
THE FIFTH FUEL (1967). 22 minutes, color.

Suitable for Understanding Levels-2 and -3.

NOT CLEARED FOR TV.

A fifth fuel—uranium—has become a useful source of energy: taking its place alongside of wood, coal, natural gas and oil, to provide power for our civilization and growth. This film explains the steps involved in preparing enriched uranium (U-235)—from the mining operation, through the exacting chemical and metallurgical processes (as exemplified by the work at USERDA's Feed Materials Production Center at Fernald, Ohio, performed to obtain a pure material), to the extrusion of precisely structured fuel elements at Ashtabula, Ohio. The film explains how such fuel cores are used to transmute Uranium-238 into plutonium at production reactor sites. Safety features throughout the various processes are emphasized. The gaseous diffusion process is touched on briefly.

HONORS: International Festival of Scientific Films, University of Brussels, Belgium.

0132
FIRE FIGHTING IN THE NUCLEAR AGE (1960). 14 minutes, color.

[illegible]e for Understanding Level-[illegible]

CLEARED FOR TV.

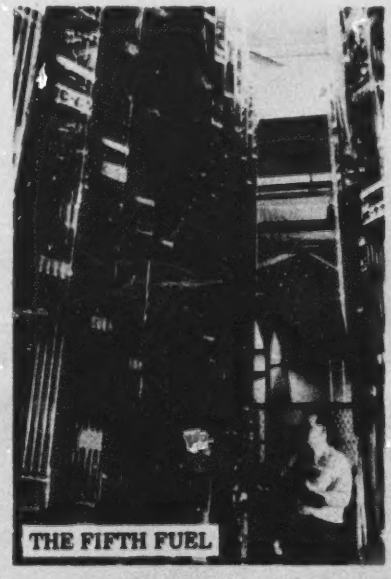
Points out that radiation is just another hazard in fire fighting which can be handled with proper training. The film uses the ERDA Fire Department at the National Reactor Testing Station in Idaho as the example, showing its training. Techniques and procedures are illustrated in the fighting of a mock fire created for this film.

0426
FIRST CHEMICAL SEPARATION OF LAWRENCIUM (1968). 17 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

Shows four important factors that made the chemical separation of lawrencium possible: (1) preparation of a target to make ^{256}Lw; (2) production


THE FIFTH FUEL

of ^{256}Lw with a half life of thirty seconds; (3) the unique transfer equipment; and (4) the chemical separation performed in about forty-five seconds.

The scenes of the actual preparation of the target in a glove box include the final separation chemistry, the plating of ^{249}Cf on a beryllium foil and inspection of the target. Next, the Heavy Ion Linear Accelerator and the target area are shown and explained, as well as the special equipment to transfer the atom of ^{256}Lw from the target area to the chemistry bench.

The film shows the preparation for the chemical separation and the rapid performance of the chemical separation before the radioactive lawrencium transmutates into another element. Finally, a detailed description of the separation chemistry, as well as an explanation of the overall experiment and its significance, is given by the research chemist.

0494
THE FIRST TWENTY-FIVE YEARS (1973). 28 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

This film, narrated by Dr. Norris Bradbury, Director of ERDA's Los Alamos Scientific Laboratory from 1945 to 1970, concentrates on the development of the first atomic bomb (1945) and the first hydrogen bomb (1952).

Overall, the film is an historical perspective by Dr. Bradbury on the role played by LASL in the development and advancement of the nuclear age. Dr. Bradbury took over the directorship of LASL from Dr. J. Robert Oppenheimer, who was the first director (1943-1945) and under whom the world's first atomic bomb was developed at Los Alamos.

Early Los Alamos history was not well documented photographically due to the nature of the ultrasecret Manhattan Project. However, through the use of available materials, especially old photographs, a perspective of the early years at LASL has been reconstructed.

The film also deals with the remarkable group of scientists gathered at Los Alamos by Dr. Oppenheimer. Included are such as Enrico Fermi, Edward Teller, Emilio Segre, Otto Frisch, James Tuck, Hans Bethe, Stan Ulam, Philip Morrison, Edwin McMillan, Victor Weisskopff and others. Famous visitors include Nils Bohr and Ernest O. Lawrence.

HONORS: INDY Winner, 15th Annual Industrial Film Awards, New York City, New York.

0138
THE FRESHER THE BETTER (1966). 13½ minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Preservation of fresh seafoods by radiation pasteurization, to extend refrigerated shelf life up to three times that of unirradiated fresh seafood, is described in this semi-technical film. The concept of using energy from atomic particles to kill or destroy microorganisms and other food spoilage bacteria is described in animated form, followed by sequences of actual research being performed. The Marine Products Development Irradiator, a semi-commercial scale food irradiation facility, is shown as products are being processed. The purpose of the film is to introduce the concept of radiation preservation of food, and to explain the process and its results. Emphasis is placed on the fact that foods processed in this way are safe for human consumption, and that each radiation pasteurized food item has to be approved by the U. S. Food and Drug Administration before it is offered for sale to the public.

HONORS: 5th International Festival of Science Films, Lyon, France; 10th International Festival of Scientific & Educational Films, Padua, Italy; 10th Gold Mercury Film Prize, Venice, Italy.

0141
THE FUEL OF THE FUTURE (1965). 29 minutes, black and white. (From the Challenge Series).

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Special precautions and techniques employed in working with plutonium are shown in a unique engineering laboratory, the Argonne Fuel Fabrication Facility, where work is performed within sealed glove boxes under an inert atmosphere. The manufacture of experimental reactor fuel pins containing plutonium is illustrated step-by-step. The film provides an in-depth description of basic research in the nuclear sciences at ERDA's Argonne National Laboratory.

0143
FUNDAMENTALS OF MECHANICAL VIBRATION (1964). 29 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

Discusses the simple systems of mechanical vibration, including spring mass, viscous coulomb, and solid damped systems. The various types of damping are illustrated by live demonstrations and animation. In addition, animated mathematical examples by Fourier are used to illustrate irregular forcing functions and their effects on engineering structures. The mathematical approach to solving composite displacement vibration problems is also discussed. (See also, RESPONSE TO MECHANICAL SHOCK.)

0487
GLOVE BOX FIRES (1973). 25 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

Improvements, relating to fire safety, made to the plutonium processing facilities of the Rocky Flats Plant after and as a result of a major fire are shown. The fire properties of glove box construction materials and means for protecting high efficiency particulate air (HEPA) filters from the effects of fire in the glove box system are presented.

The design of radiochemical processing buildings and interaction between the design and escape of particulate contamination are explained. Burning-rate tests of various construction materials installed on a full-scale glove box are shown. The high air temperatures resulting from these tests suggest that protection from heated air be provided for the HEPA filter system. Results of tests of various sprays and mist eliminators are shown.

These tests resulted in recommendations for materials and devices which are shown as installed. The relationship between these devices and fire safety of a plutonium processing facility is explained.

0449
GO FISSION (1969). 14 minutes, color.

Suitable for Understanding Levels-1 and -2.

CLEARED FOR TV.

In a "mod" style with a jazz musical score, this nuclear careers film is designed to appeal to junior and senior high school students. In a kaleidoscopic presentation, many young people are shown at work in various interesting phases of nuclear research and nuclear science and industry.

This unusual film does not have narration in the conventional sense. Instead, we hear young voices asking many varied questions about careers in the atomic field. The fast-paced visuals are, in effect, the "answers" to the questions—questions that cover: education required, clothes, living, recreation, on-job training, where the jobs

are, the kind of people with whom one would be associated, the chances for independent research, the careers for women, the types of job opportunities and many others. With sprightly humor, the film makes the serious points that people who work in the scientific and administrative fields of atomic energy are not all geniuses, that opportunities for interesting and important positions are available for all, and that people who work in nuclear energy—whatever they do and wherever they are—are just people.

0154
HANDLE WITH CARE: THE SAFE HANDLING OF RADIOISOTOPES, (1963). 21½ minutes, black and white.
Suitable for Understanding Levels-2 and -3.
NOT CLEARED FOR TV.
Covers some of the methods of safe handling of radioisotopes in a laboratory and points out the procedures followed by laboratory personnel to avoid contamination. While the film is instructional, its contents are presented in the form of a story of an unlikely, but possible, contamination incident, as a scientist goes about his work in an apparently methodical and routine manner. As he recalls the happenings of the day, the audience sees in detail all the procedures used in the safe handling of radioisotopes. The mystery of the contamination is solved at the end of the film. The film shows the use of protective clothing, radiation measuring devices such as film badges, dosimeters and counters, the handling of the radioisotopes in an experiment using a fume hood, and clean-up procedures following an experiment.

0504
HANFORD OR BUST: 7,000 MILES FOR ENERGY (1975). 28½ minutes, color.
Suitable for Understanding Level-2.
CLEARED FOR TV.
This is the story of the 7,000-mile river-and-sea-voyage of a metal giant: the largest stainless steel nuclear reactor vessel ever made—890 tons of hardware, containing the largest steel forging in history. Although primarily an entertainment travelogue, HANFORD OR BUST also gives some brief key facts about the essential testing for the breeder program, which will help place American hands on a new source of energy that could help light our cities for centuries to come.

We follow the unique 34-day journey from Chattanooga, Tennessee, to Richland, Washington—via the Tennessee and Mississippi Rivers, past New Orleans, through the Gulf of Mexico to the Panama Canal, through the Canal, up the west coast of Central America and California to the Columbia River, down the Columbia by river barge to Richland, Washington, then overland by tractor transport crawler to the desert site of the FFTF (the Fast Flux Test Facility), where the steel giant will perform vital testing necessary to make the next generation of power reactors, called "breeders," a commercial reality.

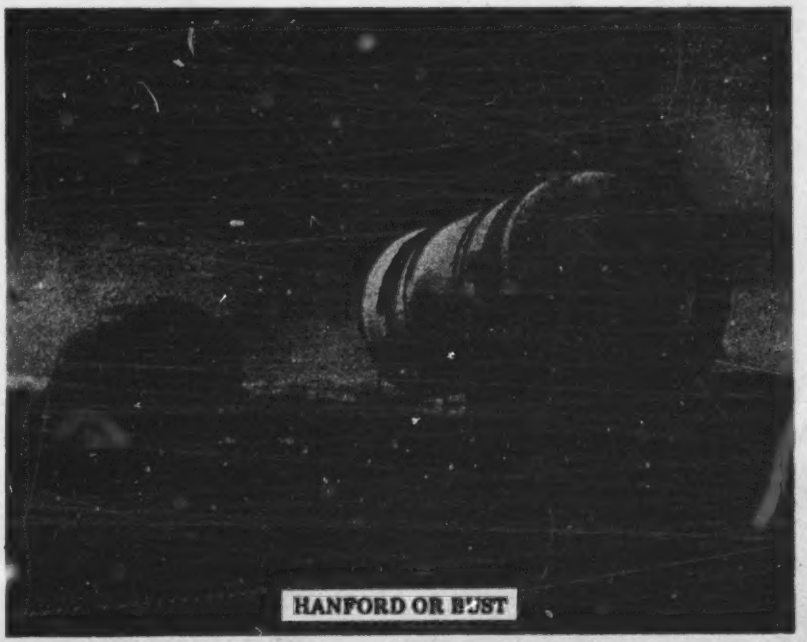
0155
HARNESSING THE RAINBOW (1965). 29 minutes, black and white.
(From the Challenge Series.)
Suitable for Understanding Levels-2 and -3.
CLEARED FOR TV.
Uses of spectroscopy in a nuclear laboratory are illustrated with instruments ranging in complexity from a simple prism to one of the world's largest and most complex light spectrographs. ERDA's Argonne scientists describe the identification of line spectra as a means of studying atomic structure. The film provides an in-depth description of basic research in the nuclear sciences at ERDA's Argonne National Laboratory.

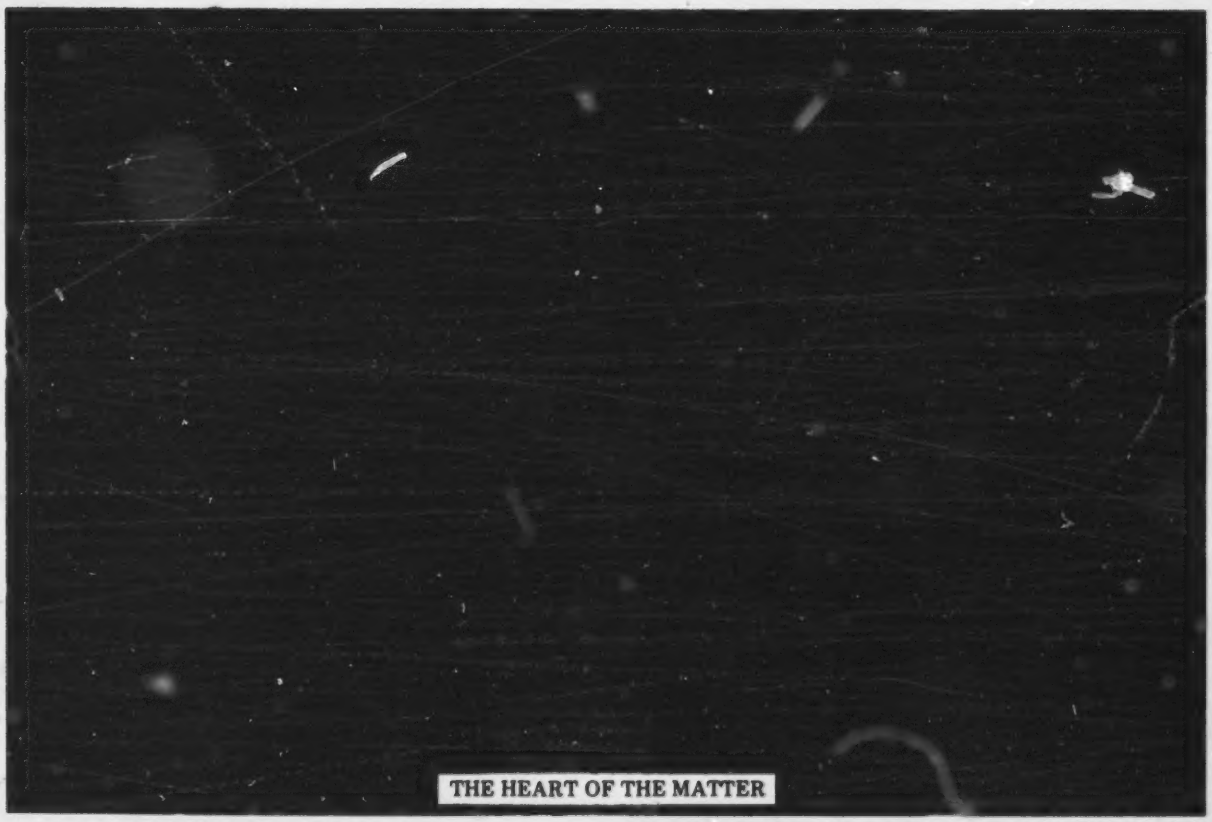
0156
HARVEST OF AN ATOMIC AGE (1963). 20 minutes, color.
Suitable for Understanding Levels-2 and -3.
CLEARED FOR TV.
Illustrates the progress achieved by U. S. scientists in using radiation to create new strains of disease- and weather-resistant food crops with higher yields. We see both the research work at ERDA's Brookhaven National Laboratory and the field work with new varieties of commercial crops. The specific example shown is the development of the Sanilac bean by Michigan State University plant geneticists. The Sanilac bean is disease-resistant and stands upright, permitting machine-harvesting. The film explains simply the theories of radiation-induced plant mutations, the methods, and the complexity of the long-term work.

ORDER BY FILM NUMBER AND TITLE

0500
THE HEART OF THE MATTER (1975). 6 minutes, color.
Suitable for Understanding Levels-2 and -3.
CLEARED FOR TV.
Today, the most powerful "microscope" ever designed to study the basic nature of matter is at the ERDA Fermi National Accelerator Laboratory (FERMILAB) near Chicago, where, in underground tunnels, scientists use atomic particles to help them search for and analyze some of the ultimate particles of matter.

Dr. Robert Wilson, Director of FERMILAB, tells us that to study atomic structure, special "microscopes" are used, millions of times more powerful than ordinary micro-





THE HEART OF THE MATTER

scopes, and that high energy protons, rather light, are used for these studies.

We learn that protons are stripped from atoms and focused into a narrow beam which is accelerated to hundreds of billions of electron volts. The beam is guided into the main accelerator—an underground ring four miles around—where it spins faster, with a thousand magnets keeping it on course, at almost the speed of light itself! Then the proton-bullets are channeled into targets, one of the main ones being the world's largest bubble chamber—a huge tank filled with liquid hydrogen. Particles created by the collision of the protons with the target produced bubble-tracks in the chamber. The tracks are photographed and analyzed.

Dr. Leon Lederman of Colorado University explains how high energy protons strike other type targets, and how an array of sensitive machines detect the particles coming from the collision. This information is electronically examined, filtered and stored. Eventually the information is correlated into theories that help explain the basic nature of matter.

FERMILAB's unique facilities are available to qualified scientists from universities around the world.

ORDER BY FILM NUMBER AND TITLE

0159
HEAVY PARTICLE BEAMS IN MEDICINE (1964). 11 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

Gives a brief historical development of the medical uses of cyclotrons and shows the unique properties of accelerator-produced heavy particles both in investigative studies and in radiation therapy. Experience at the Donner Laboratory shows that this new tool of nuclear medicine when used in pituitary irradiation provides creditable results in the treatment of acromegaly, Cushing's disease, and the retardation of diabetic retinitis. In addition, the Bragg effect of alpha particle radiation is of increasing importance in direct treatment of tumors of the brain and soft tissue.

0499
HERE COMES THE SUN (1974). 15 minutes, color.

Suitable for Understanding Level-2.

CLEARED FOR TV.

In Massachusetts, Maryland, Virginia and Minnesota solar energy "goes to school," as students, teachers and the communities at large find solar heating an important asset to help relieve the energy shortage, and in the process learn how the systems work.

"Strange shapes" on the landscape are solar collectors—huge windowpanes lined up side by side—facing the sun and collecting part of its enormous output of energy: collecting and storing and using it directly for heating, in experiments sponsored by the National Science Foundation.

In classrooms of the "solar schools," students discuss: the use of pumped water, passing through small metal channels in the solar collectors,

HERE COMES THE SUN

just below the surface of the glass; the "greenhouse effect" of heat waves penetrating the glass and heating the water; heated water pumped through pipes into the buildings and into storage tanks (to be used when the sun is not out).

We see scenes of the collectors, the control centers, a solar experimental van, etc. Some solar collectors are roof-mounted, some are on the ground. In one of the Minneapolis schools, the solar heat is used to heat the air in the swimming pool. In another school, solar-heated water is used to wash dishes.

HONORS: CINE Golden Eagle Award, Washington, DC.

0450
HORIZONS UNLIMITED (1969). 37 minutes, color.

Suitable for Understanding Level-2.

CLEARED FOR TV.

Urges young people to think carefully about their future and raises certain questions that should be considered in this regard. The growth of nuclear energy and its applications have opened the door for all kinds of career opportunities. Due to the tremendous energy available from the atom, brand new industries have sprung up. The role of nuclear power to produce electricity, desalt seawater, manufacture fertilizer, propel rockets, and mine minerals is described. Nuclear fuel processing is noted as one of the new industries emerging which will recover unused fuel and reclaim radioisotopes, a valuable by-product useful in numerous medical, research, and industrial applications.

Nuclear research and the tools used by nuclear scientists and engineers are briefly examined. Nuclear science has made a substantial contribution to the life sciences, where researchers investigate the biological processes which produce and sustain life. One of the most exciting applications of nuclear energy, thermonuclear fusion, is still to be developed. The potential benefits are many, but taking advantage of them will require creative young minds.

One of three films in nuclear science and nuclear engineering produced with the assistance of the American Nuclear Society. The basic purpose of these three films is to motivate students in their formative years to consider careers in the field of nuclear science and engineering. (Use with PREPARING FOR TOMORROW'S WORLD, page 45, and YOUR PLACE IN THE NUCLEAR AGE, page 62.)

0172
THE IMMUNE RESPONSE (1962). 29 minutes, black and white.

(From the Challenge Series.)

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Is concerned with the mechanism by which the body builds antibodies against disease and other foreign substances and with the effects of radiation on this immunizing response. In a demonstration the experimental procedures of the irradiation of rabbits with X-rays is shown and conclusions are discussed. A film which provides an in-depth description on basic research in the nuclear sciences at ERDA's Argonne National Laboratory.

0454
IN SEARCH OF A CRITICAL MOMENT (1970). 28 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

This artistic film tells the story of the ZPPR—the Zero Power Plutonium Reactor—a special split-table test reactor that is designed to supply information essential to the development of economic fast breeder central station nuclear power plants. *Although most* current reactors "burn" uranium, the trend is toward fast breeder reactors that will produce or "breed" more nuclear fuel (plutonium) than they consume, thus dramatically increasing the world's supply of fissionable material. But to achieve these goals, experimentation is necessary—resulting in machines to study the core designs of future breeder reactors. Animation shows the ZPPR, in which the composition, configuration and performance of fast breeder cores are tested. Criticality of the ZPPR is achieved by loading two separate "tables" with plutonium fuel and bringing them slowly together. The film shows the construction of the ZPPR by Argonne National Laboratory, its many safety features, plutonium handling and storage, the instrumentation and computer to record and analyze data obtained by the ZPPR, and the fuel loading and eventual attainment of the state of criticality of the ZPPR to prepare it for its important testing program.

HONORS: Gold Camera, U. S. Industrial Film Festival, Chicago, Illinois; 18th International Nuclear Congress, Rome, Italy.

0408
INSIDE THE YANKEE CORE (1967). 32 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

Describes in detail the most extensive and complete post-irradiation program ever performed on an expended commercial power-reactor core—in a sense, a detailed autopsy on the heart of an atomic power plant. It shows the actual work that was done and explains why and how the first core of the Yankee Atomic Plant reactor was destructively analyzed. The film explains the procedure used to select fuel assemblies and individual fuel rods so that, with inherent core symmetries taken into account, a three dimensional map of measured burnup and isotopic content could be constructed and compared against predictions.

Fuel scheduled for examination is followed from the Yankee site at Rowe, Mass., to the Westinghouse Post-Irradiation Facility at Waltz Mill, Pa., where intact assemblies are inspected visually, measured, and gamma scanned. Selected fuel rods are shown being removed from the assemblies and transferred to the hot cells for destructive examination.

HORIZONS UNLIMITED

0180
INTRODUCING ATOMS AND NUCLEAR ENERGY (1963). 11 minutes, black and white or color.

Suitable for Understanding Level-2.

NOT CLEARED FOR TV.

Although this teaching film—explaining the general structure of the atom and showing how changes in the nucleus may produce energy used by man—was prepared for intermediate grades and junior high school use, it will also be useful for lay-level adult audiences that wish a basic, concise primer on the subject. The film discusses: the composition of atoms—protons and electrons; how the nucleus releases the energy of the atom by losing particles (decomposition); nuclear fission, chain reaction and nuclear reactors; nuclear fusion in the sun; and, very briefly, the uses of nuclear energy.

0481
INTRODUCTION TO ANALOG COMPUTERS (1963). 2 hours, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

This three-part technical lecture-film (approximately 40 minutes per part) by Dr. L. C. Just of Argonne's Applied Mathematics Division includes: (1) components of electronic analog computers, (2) familiarization with a typical analog computer, (3) programming for analog computers, and (4) solution of typical problems.

0181
INTRODUCTION TO HIGH VACUUM (1961). 18 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Defines high vacuum and shows how it is produced and measured. Information is given on the contributions of Torricelli and Von Guericke to vacuum physics; how vacuum is expressed (millimeters of mercury, Torr, particles per cubic centimeter); flow characteristics (viscous and molecular) of gases under vacuum and their influences on vacuum techniques; mechanical and nonmechanical vacuum pumps and their principles of operation (oil-seal rotary, dry-seal roots, diffusion, and getter-ion types); mechanical and nonmechanical vacuum gauges and their principles of operation (McLeod mercury, thermocouple, and ionization); and typical examples of applications of high-vacuum techniques in product manufacture and in scientific research (freeze-drying process, thin-film-evaporation process, and thermonuclear experiments).

0182
INVISIBLE BULLETS (1962). 29 minutes, black and white.

(From the Challenge Series.)

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Introduces the series and establishes the basic knowledge about radiation necessary for an understanding of the other films in the series. The meaning of radiation, its natural sources, the various forms it takes, and how it is used in research are explained. The difference between alpha and beta particles and between gamma rays and X-rays is described. The film provides an in-depth description of basic research in the nuclear sciences at ERDA's Argonne National Laboratory.

ORDER BY FILM NUMBER AND TITLE

0466
ISOTOPES IN ENVIRONMENTAL CONTROL (1971). 14 minutes.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Shows some of the ways radioactive atoms are being used to help man safeguard his environment. Neutron activation analysis is applied to tracing oil spills. Radioactive tracers show the absorption of oxygen by flowing water. Other tracers are used to determine the drifting of sand on the ocean floor. Chemical and nuclear techniques are used in combination to study air pollution by sulfur oxides.

HONORS: Chris Award, Columbus Film Festival, Columbus, Ohio.

0446
A JOURNAL OF PLUTONIUM (1969). 47 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

Largely by interview, this film is a chronicle of the men and events that led to the discovery, separation and large scale production of plutonium—the most important new element discovered in the last half century. Through the personal reminiscences of Dr. Glenn T. Seaborg, Dr. Emilio Segre, Burris Cunningham and others, the personal story of the men who discovered plutonium, purified and weighed it, and eventually produced it on a large industrial scale for the wartime Manhattan Project is told. Only four years elapsed between the discovery of the new transuranium element and its first isolation in quantity—truly an unprecedented chapter in the basic history of chemistry. Since the end of World War II, plutonium has also played a very active role in the peaceful uses of atomic energy—as the nuclear fuel in a fast breeder reactor, as the power sources for small, compact isotopic generators in space, and as the potential power source for heart pacers and artificial hearts.

0490
LANDMARK (1973). 13½ minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

For 200 years it took all kinds of energy—man and horsepower, water and windpower—to build America. Of all the forms of energy, it is mostly electricity that keeps our Nation going and growing. We generate and use more than one-third of all the world's electrical power, and every 10 years our needs double. For the most part, we create our electrical energy by burning coal, oil and natural gas. In addition, a small amount of today's electricity comes from falling water, and about four percent is nuclear power.

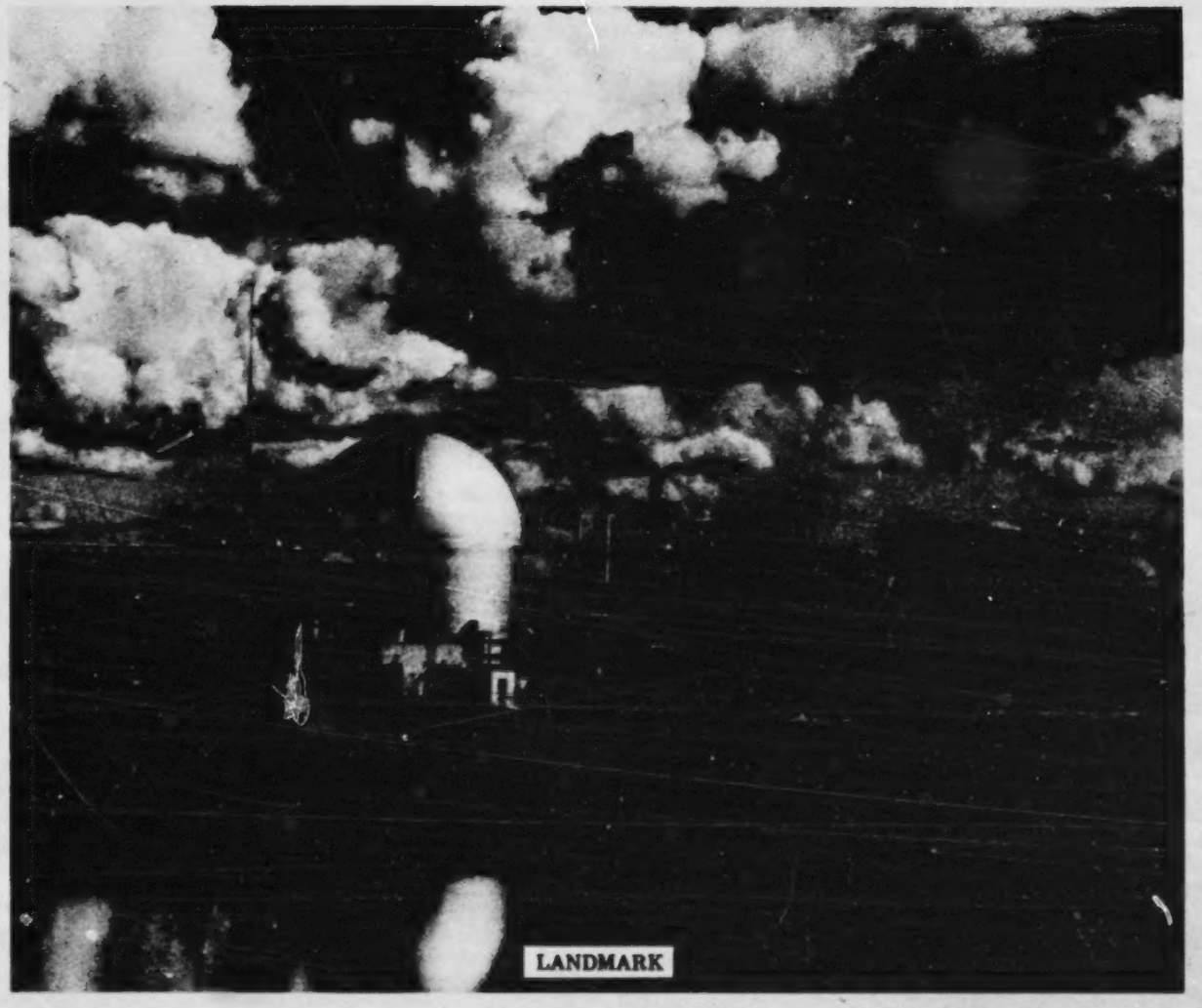
LANDMARK takes us back twenty-two years before the energy shortage, when the United States built the world's first experimental breeder reactor. This was the first nuclear energy machine to produce electrical power anywhere. Breeder reactors are important in this time of energy and fuel shortages because the breeder machine has the unique ability to produce more fuel than it uses while it generates electricity.

The breeder will convert idle, stored, non-fissionable uranium-238 into plutonium—a man-made fissionable fuel that can be used to fuel other reactors—thus freeing conventional fossil fuels for petrochemical uses, and extending our nuclear fuel resources from 25 years to centuries.

With scientific foresight, more than two decades of technology in research and testing have proved the safety and reliability of breeder reactors. Now, in this time of growing energy shortages, LANDMARK shows how the Government and the American utility industry are gearing up to build and operate a full-scale fast breeder demonstration plant.

When breeder reactors are commercially competitive in the 1980s, they will save this country more than 200 billion dollars in the first 30 years of operation.

HONORS: INDY Winner, 15th Annual Industrial Film Awards, New York City, New York; 2nd Birmingham



Film Festival, Birmingham, England; International Trade Fair Energy Spectrum, Salonika, Greece; Smithsonian Energy Film Series, Washington, D. C.

0482
LINK (1967). 8 minutes, color.
Suitable for Understanding Level-3.
CLEARED FOR TV.
Explains that current experiments in high energy physics involve the analysis of immense quantities of data. A typical experiment using a spark chamber can require the examination of a half million photographs. For analysis each track must be reconstructed from the photographs and located in space so that the particles can be identified and their moments calculated. An experimental computer approach at ERDA's Argonne National Laboratory centers about a series of programs which match points in the photographs and draw a curve bit by bit. LINK, the program which draws the curve, utilizes an unusual trial-and-error approach which is illustrated by the photographs of an oscilloscope readout as curves are developed.

A particularly interesting facet of the LINK film is its computer-generated avant-garde music. Dr. Arthur Roberts, high-energy physicist at Argonne, combines his talent as a composer with a CDC-3600 computer to generate a number of intriguing sounds which simulate the instruments in an orchestra. The result is an interesting study in computer-performed music which accurately matches the mood of the computer-high energy physics work pictured.

HONORS: 15th Columbus Film Festival, Ohio; Scientific Film Festival, Lyon, France.

0192
THE LIVING SOLID (1962). 29 minutes, black and white.
(From the Challenge Series.)
Suitable for Understanding Levels-2 and -3.
CLEARED FOR TV.
Shows that bone is not a fairly stable substance but is active, living matter, constantly remodeling and reforming itself. The importance of bone to the entire body as a supplier of calcium is emphasized, and the systems by which this calcium gets from bone to blood and vice versa are illustrated. Effects of radiation are illustrated in photographs of bone cross-sections. The film provides an in-depth description of basic research in the nuclear sciences at ERDA's Argonne National Laboratory.

0193
LIVING WITH A GLOVED BOX (1964). 15 minutes, color.
Suitable for Understanding Levels-2 and -3.
CLEARED FOR TV.
Explains the principles and techniques of working with a gloved box—an

enclosure designed for handling radioactive materials of low activity which present a hazard primarily through inhalation and ingestion. The film opens with an explanation of how air currents and turbulences carry various substances, some of which may be hazardous. It shows why highly toxic materials like plutonium can best be handled in a gloved box. The principles of the gloved box are then explained in detail. Such items are covered as: the air flow and pressures within the box; the "bagging in" and "bagging out" of materials; the procedures for changing gloves on the box; and changing of the filter, and a method for handling a fire within the box.

0199
MAN AND RADIATION (1963). 28½ minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Discusses many aspects of radiation and offers a survey of their widespread beneficial applications in medicine, industry, agriculture, power, and research. A historical survey of the discovery of radiation is followed by an animated explanation of different types of radiation, including alpha, beta, and gamma. A brief explanation of radioisotopes and how they are produced is given, followed by scenes depicting some of their uses, including the use of Calcium-47 to diagnose bone cancer. The detection and study of radiation by sensitive instruments is explained. The study of radiation in the laboratory is demonstrated with work in photosynthesis using radiochromatography. Several important industrial uses of radiation are shown. The use of irradiation for prolonged food preservation, particularly of such highly perishable food as fresh fish and the production of a new material, a wood-plastic alloy, is also shown.

HONORS: 2nd International Festival of Red Cross & Health Films, Varna, Bulgaria; 12th International Nuclear Congress, Rome, Italy.

0201
THE MANY FACES OF ARGONNE (1963). 60 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Survey of the objectives, methods, and hardware of the broad range of nuclear research conducted by a typical national laboratory of the Energy Research and Development Administration. With both artistry and clarity, the Argonne National Laboratory (ANL) narrator shows the CP-5 and the range of work accomplished with this powerful research reactor. In an ANL chemistry laboratory, investigation of atomic forces with "color center" studies of the structure of crystals is shown. Information is given on methods of protecting atomic scientists from radiation.

Argonne's efforts in the power reactor field are summarized, using the Experimental Breeder Reactor II as an example, with detailed explanation of its components, purposes, and methods. Experiments to learn the effects of radiation on human beings are explained—studies of the effects of radiation received continually over a lifetime (bone-tumor studies); studies of the mutation-producing effects of radiation (fruitfly studies, work with dogs, etc.); studies of neonatal rates; life-span studies; studies of leukemia; effects of radiation on cells.

Shows in detail the giant Zero Gradient Synchrotron accelerator—or "atom-smasher"—used to tear apart subatomic particles to study the basic nature of matter. Argonne's relation to American universities is outlined, with views of the training of foreign students.

0202
THE MASS OF ATOMS (1966). 47 minutes total (Part I—20 min., Part II—27 min.), black and white.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

The step-by-step operations in an experiment performed by two Mound Laboratory scientists to determine the masses of a helium atom and a polonium atom. Throughout the film, the various laboratory techniques and precautions necessary for these measurements are shown in detail. In addition, students will learn something of radio-chemical techniques.

In Part I, a sample of radioactive polonium is weighed and sealed in an evacuated quartz tube, and then left to decay. The collection of alpha particles from the decaying polonium provides a sample of helium. In Part II, after a three-week period, the mass of helium sample accumulated is determined, and the rate of decay of the polonium is measured. From these data the atomic masses of helium and polonium are determined.

0208
METALS FRONTIER (1961). 22 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

A story of teamwork in research is designed for an audience with an appreciable degree of scientific sophistication, primarily seniors and graduate students in the physical sciences and engineering. Highlights in the operations of ERDA's Ames Laboratory are shown by illustrating the steps in the development of the process for the production of yttrium metal. The film also gives insight into the facilities and the pioneering tradition of Ames Laboratory in the investigation of the rare earths. The film is panoramic in style, showing how basic research, development, and production go along together. The following steps in metal processing are shown: separation of yttrium from rare earths, conversion to fluoride, reduction, and arc melting. Special emphasis is given to purity and to the need for careful analytical control. The film also shows how the graduate student fits into the laboratory's research program.

0210
MICROSCOPE FOR THE UNKNOWN (1965). 29 minutes, black and white. (From the Challenge Series.)

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

The Zero Gradient Proton Synchrotron at ERDA's Argonne National Laboratory is the scene of this presentation depicting types of experimental

apparatus used in high energy physics research. Principles of "track detectors" such as the bubble chamber and the spark chamber are described, and the interpretation of track photographs is explained. A large spark chamber facility for detecting neutrinos and the 30-inch MURA bubble chamber are illustrated in detail. The film provides an in-depth description of basic research in the nuclear sciences at ERDA's Argonne National Laboratory.

0420
THE MIGHTY ATOM (1968). 27 minutes, color.

Suitable for Understanding Levels-2 and -3.

NOT CLEARED FOR TV.

Makes a summary examination of the peaceful uses of atomic energy today and in the future, with Host-Narrator Walter Cronkite. Touched upon briefly are: the need for nuclear power; the nuclear merchant ship, the N. S. *Savannah;* nuclear propulsion for space rockets; SNAP (nuclear) generators which supply power for remote unmanned weather stations and off-shore oil rigs; use of the atom's energy to preserve foods by irradiation; nuclear medicine: the fight against cancer; nuclear-powered man-made hearts; the theory of atomic fission and the controlled nuclear reaction in a reactor; the burial of atomic wastes and research into the future; the theory and operation of giant accelerators to smash atoms and study their subatomic particles; breeder reactors, desalting plants, agro-centers, the controlled fusion reactor.

0211
MIRACLE IN THE DESERT: THE STORY OF HANFORD (1966). 28½ minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Tells the story of the development during World War II of the Hanford Engineering Works in southeastern Washington. Construction of the billion dollar plant was based on the discovery of the new element 94, plutonium, in California by Dr. Glenn T. Seaborg and others, in 1941, and on the demonstration of the first successful nuclear chain reaction in Chicago by Dr. Enrico Fermi and others, in 1942.

Starting with construction of the secret Hanford nuclear plant in 1943, additions and improvements were made to plant facilities in the post-war years in the creation of plutonium by transmutation of uranium atoms and its chemical separation from uranium. Also shown is the New Production Reactor, the nation's first dual-purpose reactor to produce plutonium for military needs and steam to generate electricity.

Hanford's broad research efforts in the fields of metallurgy, radiation effects, biology, aquatic biology, atmospheric physics and other peaceful uses of atomic energy are summarized. Conversion of the plant from military needs to work on peaceful uses of nuclear energy is detailed. An explanation is given of how community and government agencies cooperated to institute a multiple-contractor operation, attract new, diversified industry and create new jobs.

0435
MOLECULAR BIOLOGY: An Introduction (1969). 15 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

The new science of molecular biology has emerged to dominate the life sciences and open up the new frontiers of biophysics and biochemical research. To measure and document this exploration into the molecular and atomic levels of the cell, technology has developed more refined and sophisticated research tools: the improved resolution of the electron microscope, the isolation of cell parts by ultracentrifugation, the separation capabilities of chromatography, the localization of autoradiography, and the sensitivity of liquid scintillation counting. The past achievements using these tools strengthen the belief that the function and structure of the cell can be integrated. When used in conjunction with radioactive tracers, these tools may someday contribute the basic information needed to find the cause and cure of human cancer and many other diseases.

0417
MOLTEN SALT REACTOR EXPERIMENT (1968). 20 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

Describes the design, construction and operation of the Molten Salt Reactor Experiment (MSRE), which is a fluid fuel, rather than solid fuel reactor.

Extensive animation is used to illustrate what takes place in the reactor system during operation. Developmental work prior to fabricating many of the reactor's major components, such as the reactor vessel and salt-to-air radiator, also is presented. A portion of the film is devoted to a discussion of the composition and circulation path of the molten salt fuel as well as the reactor cooling and control systems. It is pointed out that, based upon the successful operation of the MSRE, thermal breeder reactors could have many practical construction and operating advantages, and that molten-salt reactors appear to be very attractive thermal breeders.

0497
NATURE'S FORGE (1974). 29 minutes, color.

Suitable for Understanding Levels-2 and 3.

CLEARED FOR TV.

Against a background of the icy lakes, volcanic mountains and wooded valleys of North America 10,000 years ago, this artistic film tells the story of how species competed against species for survival in nature's forge of fire and ice. Animals, insects, plants and man—all living things that had learned to adapt—survived and flourished in a wide range of temperatures. In breathtaking photography, we see the animals, birds and cavedwelling Indians in an accurate recreation of the great Northwest at the end of the last Ice Age.

The story is brought up to today, when our complex society demands vast amounts of electrical energy—energy produced from the fossil fuels born millions of years ago as storehouses of the sun's energy. And, finally, nuclear power plants. But, all plants—whether fossil or nuclear—produce excess heat: waste heat which is largely released to bodies of water. Excess heat from power plants often follows the same process as heat from the sun. The same sun pours the energy equivalent of 6,000 large power plants upon the Great Lakes every year.

Yet as small as the effect is of man's released heat on a global scale, such thermal effects at local levels must be carefully considered for each environment. The Government and commercial operators of nuclear plants are deeply committed to continual in-depth research on the effects of excess heat on fish, plants and animals, in studies searching for long-term effects. Brooks are channeled through laboratories. The movement and transfer of heat in lakes are studied. Fish are studied in the Great Lakes and at such great rivers as the Connecticut and the Columbia. Conclusion to date: some species suffer adverse pressure, some species benefit from the heat, but the great majority appear unaffected.

HONORS: 23rd International Festival of Mountain and Exploration Films, Trento, Italy; accepted by USIA for worldwide use.

ORDER BY FILM NUMBER AND TITLE

0217
NEUTRON ACTIVATION ANALYSIS (1964). 40 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

Deals with the nature, potentialities, and applications of neutron activation analysis—a highly sensitive and powerful analytical technique that has grown out of the study of peaceful uses of nuclear energy. It is a method of analyzing samples for various elements by bombarding them with neutrons to make some of the elements radioactive, and then identifying and measuring the induced radioactivities to complete the quantitative analysis. The film shows the kinds of neutron sources used (isotopic, accelerator, and nuclear reactor), the latest counting techniques employed (especially those of multichannel gamma-ray spectrometry and spectrum stripping).

Interesting examples of recent applications of the method in the fields of scientific crime detection, geology and geochemistry, agriculture, medicine, the petroleum and chemical industries, and the semiconductor industry are shown.

HONORS: ANZAAS 3rd International Scientific Film Festival, Australia & New Zealand.

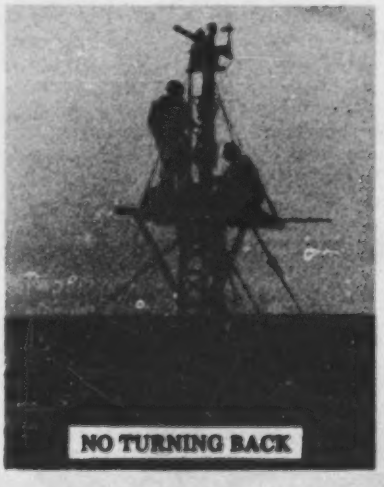
0461
NO TURNING BACK (1971). 27½ minutes.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Since its beginning, the U. S. Atomic Energy Commission has made outstanding contributions to environmental research. This film visits some of the men involved in ERDA-supported ecology studies at laboratories and sites across the country. As these scientists discuss their own areas of research, the camera dwells, at each location, on the forms and variety of life, the interaction of plants and animals and man's impact on nature and the environment.

Among the areas visited are: the ALE (Arid Land Ecology) reserve—a vast, desert steppe laboratory in southeastern Washington State; the "Climatron"—a tropical forest study at the Missouri Botanical Garden; ERDA plants—Savannah River in South Carolina and Hanford on the Columbia River—where extensive research on river ecosystems takes place; Lake Michigan—where Argonne National Laboratory scientists study the impact



of industry on natural waterways; a vast, isolated forest near Oak Ridge, Tennessee—where the effects of large-scale fertilization on forests and streams can be studied in depth; an airport near Brookhaven National Laboratory—where industry's smoke plumes are monitored to study pollution patterns in the layers of atmosphere that blanket large metropolitan areas.

Narrated by Lorne Greene of television's "Bonanza" fame, this film points up the government's long-term commitment to environmental research and the clear importance of further study in the search for final answers. It helps us to see man's obligation to the fragile biosphere that sustains him and his need to improve the quality of life on earth.

HONORS: 9th ANZAAS International Scientific Film Exhibition, Association for the Advancement of Science, Australia and New Zealand; American Society for Microbiology, Philadelphia, Pennsylvania; National Educational Film Festival, Oakland, California; 1st International Film Festival on the Human Environment, Montreal, Canada.

0453
NUCLEAR FINGERPRINTING OF ANCIENT POTTERY (1970). 20 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

The nuclear "fingerprint" of an ancient piece of pottery is an extremely precise chemical analysis of the material in that item by nuclear techniques. The fingerprint is obtained by first removing a small sample of the pottery item, then irradiating the sample inside a nuclear reactor. The radioactive isotopes produced emit different amounts and intensities of radiation, which are analyzed by a germanium detector and other electronic equipment. A documentary section of live sound and true action gives the audience insight into how the research is actually conducted. The nuclear technique of pottery identification gives archeologists a means of knowing where pottery came from, which is independent of stylistic criteria and does not depend upon inferences as to where particular styles arose. The film illustrates some actual results from which imported and locally made potteries were distinguished when this could not be done with confidence on stylistic grounds alone. By retaining this data in the computer bank, the beginning of a fingerprint file on ancient pottery is underway.

NUCLEAR FINGERPRINTING OF ANCIENT POTTERY

HONORS: 8th Show of Technical Scientific and Educational Films in Industry, Pardubice, Czechoslovakia; Industrial Photography Festival, New York City, N. Y.; Industrial Management Society, Chicago, Illinois; Information Film Producers of America, National Conference, Los Angeles, California; Chicago International Film Festival, Illinois; 3rd International Scientific Film Festival, Rio de Janeiro, Brazil; 20th International Festival of Mountains and Exploration Films, Trento, Italy, 14th American Film Festival, New York City, New York.

ORDER BY FILM NUMBER AND TITLE

0467
NUCLEAR INNOVATIONS IN PROCESS CONTROL (1971). 17 minutes.

Suitable for Understanding Level-3.

CLEARED FOR TV.

Depicts the great versatility and sophistication of nuclear methods that now are available for control of industrial processes and for nondestructive testing. The rapid response time of these techniques makes it possible to incorporate nuclear instrumentation into a loop that provides automatic control of paper production and into many steps of the processing of iron ore. The techniques are used in determining moisture content and in detecting impurities in a variety of materials, in determining alloy composition, in determining high roadbed density, in detecting defects in turbine blades, and in determining the basic crystal structure of a metal.

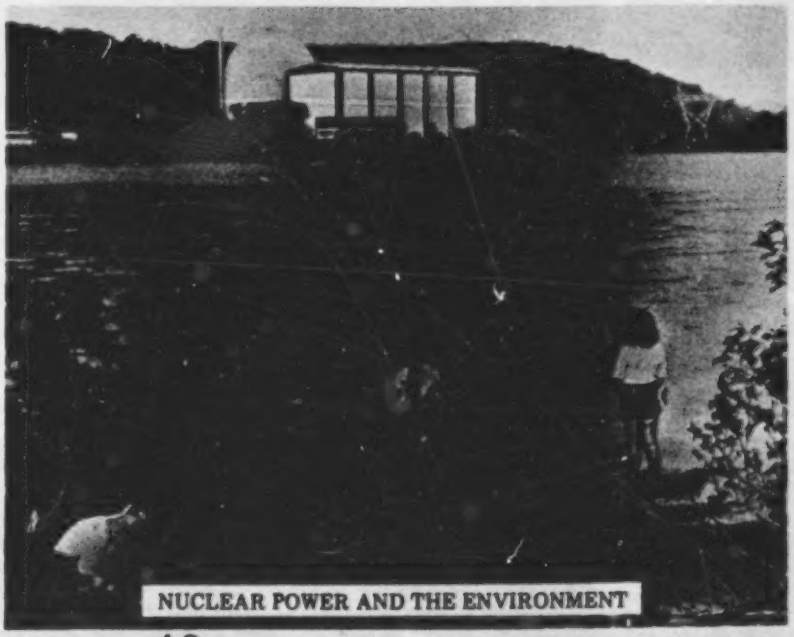
HONORS: Chris Award, Columbus Film Festival, Columbus, Ohio.

0447
NUCLEAR POWER AND THE ENVIRONMENT (1969). 14 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

In a strikingly beautiful presentation, the film takes up the problems that stem from the growing demands for electricity in the U. S., demands which are doubling every 10 years. To meet these future needs, the most practical



NUCLEAR POWER AND THE ENVIRONMENT

means of producing power in large amounts is to build steam-powered electrical power plants—both fossil-fueled and nuclear.

The film discusses the great care taken in studying and controlling effects of nuclear power plants on the environment. Environmental surveys are conducted to predict and control effects on fish life, ecology and hydrology. Problems from thermal effects (heated water) are avoided, with artificial cooling ponds, cooling towers, and careful selection of the plant site. The releases of radioactivity to the atmosphere and in the cooling water are carefully controlled under rigid regulations. Storage of waste products, safety of nuclear plants and esthetic values are also touched in this currently important presentation.

HONORS: National Youth Conference on the Atom, Chicago, Illinois; 8th Show of Technical Scientific Films in Industry, Pardubice, Czechoslovakia; 5th International Conference on Water Pollution Research, San Francisco, California; CINE (Council on Non-theatrical Events), Washington, D. C.; 11th International Award of the Technical Cinema, Rome, Italy; 3rd International Scientific Film Festival, Rio de Janeiro, Brazil; Mining Convention of the American Mining Congress, San Francisco, California; American Society of Civil Engineers, Cincinnati, Ohio.

0226
NUCLEAR POWER FOR SPACE—SNAP-9A (1963). 12 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

After showing the launching of a new satellite, which is being wholly powered by a nuclear generator, animation is used to explain the use of its isotopic generator to create power to run electronic equipment, recording equipment, and transmit data back to earth for analysis. The advantages of nuclear energy are shown over the use of chemical energy and solar energy. The principles of power generation by isotopic decay are explained, showing how thermocouples convert the decaying isotopes' heat directly to electricity. A comparison of the isotopes Plutonium-238 and Curium-242, both used in SNAP isotope power systems, is made. It discusses the design features of the SNAP-9A which are the result of 7 years of research. Safety tests of the isotope capsule, including explosion tests, fire tests, impact tests, and re-entry tests are shown.

ORDER BY FILM NUMBER AND TITLE

0468
NUCLEAR POWER IN THE UNITED STATES (1971). 28 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

By the year 2000, it is estimated that close to half of all the electrical power needs of the United States will come from nuclear energy power plants. To meet these projected demands for yet more power, the former United States Atomic Energy Commission spent more than two decades in the development of thermal reactors as well as performing research on various advanced reactor concepts.

This film describes the implementation of plutonium-recycle programs and the thrust of the liquid metal fast breeder. The entire spectrum of the nuclear power industry is touched upon including SEFOR, LMEC, FFTF, EBR-II and the work being performed at Enrico Fermi, Dresden, Hanford and Shippingport. The film not only discusses the liquid metal fast breeder, but tells of the work being done on other advanced reactor concepts such as the high temperature gas cooled reactor, the molten salt breeder and the low gain thermal breeder.

HONORS: Industrial College of the Armed Forces Seminars; American Society of Civil Engineers, Cincinnati, Ohio.

0227
NUCLEAR REACTIONS (1963). 29½ minutes.

(From the Understanding The Atom series).

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

This segment of the series continues the discussion of the film "Alpha, Beta, and Gamma," and involves some of the basic concepts of nuclear reactions. Neutron capture processes are described with the gamma emission and particle ejection reactions being studied. Nuclear fission is also discussed. As an example of the calculations involved in nuclear reactions, the film describes the activation of a gold sample in a nuclear reactor. Emphasis is placed on the minute quantities which can be detected with the subsequent applications to the technique of activation analysis. It is shown that hundredths of a part per billion of certain materials can be detected by nuclear techniques.

The lecture film, designed for a high school senior-level chemistry or physics course, or as the introductory unit in nuclear science at the college level, is presented by Dr. Ralph T. Overman, former Chairman, Oak Ridge Institute of Nuclear Studies.

0230
NUCLEAR REACTOR SPACE POWER SYSTEMS (1964). 8 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

Summarizes the program to develop nuclear reactor power supplies for large space vehicles. Fabrication and testing of a 500-watt thermoelectric system, a 3,000-watt turboelectric system, and a reactor for a 35,000-watt turboelectric system are highlighted. Also featured is a 300—1,000-kwe turboelectric system. The reliability, high power levels, long unattended operating life, and safety characteristics of space nuclear power systems are reviewed. These units are being developed by Atomics International and Pratt & Whitney.

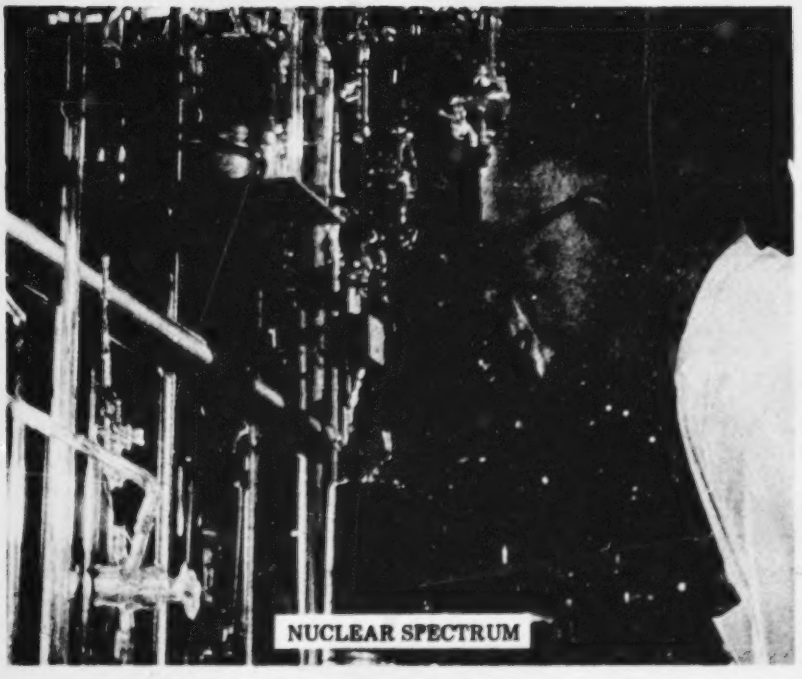
0493
NUCLEAR SPECTRUM (1973). 28 minutes, color.

Suitable for understanding Levels-2 and -3.

CLEARED FOR TV.

Every day scientists work in new directions, face new problems, discover new information. Because of the growing complexity of the new sciences, much of this work is only dimly perceived by the average person. The purpose of such investigations is based on the belief that most discoveries eventually benefit mankind—perhaps in chemistry, in physics, in mathematics, in engineering, or biology and medicine . . . as man continually tries to improve his understanding of the life processes.

NUCLEAR SPECTRUM visits the laboratories, and documents new investigations, through the voices and words of the scientists directly involved in nuclear research and development or its many spinoff applications. The cast is impressive: Dr. Norman Anderson of ERDA's Oak Ridge National Laboratory (ultracentrifuges in molecular biological studies of the human cell), Dr. George Reynolds of Princeton University (image intensification), Dr. Harold Furth, Princeton University (controlled fusion research), Dr. Fred Goulding of ERDA's Lawrence Berkeley Laboratory (semiconductor detectors), Dr. Powell Richards of ERDA's Brookhaven National Laboratory (technetium-99m as a radioactive tracer in nuclear medicine), Dr. David Kuhl of the University of Pennsylvania (clinical brain scanning), Robert Jaske and William Tem-



pleton of the Pacific Northwest Laboratory (studies of waste heat in aquatic biology), and Dr. Loren Eiseley, internationally known anthropologist.

HONORS: Second Birmingham Film Festival, Birmingham, England; American Film Festival, New York City, N. Y.

0233
THE NUCLEAR WITNESS: ACTIVATION ANALYSIS IN CRIME INVESTIGATION (1966). 28 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Describes a new technique in the examination of physical evidence involved in crime investigation called "Activation Analysis." This method is some 100 to 1,000 times more powerful (more sensitive) for the detection of most elements than methods currently available in the usual crime laboratory. Evidence-samples too small to be analyzed by other methods (even microscopic samples) can often be analyzed successfully by this new technique, and tell-tale bare trace concentrations can be measured. Frequently, the analysis can be done nondestructively—thus preserving the samples.

This highly sensitive and powerful analytical technique is a method of analyzing samples for various elements by bombarding them with neutrons, to make some of the elements radioactive, and then identifying and measuring the induced radioactivities to complete the quantitative analysis.

The film shows the application of activation analysis to the investigation of several illustrative types of criminal cases; murder, burglary, and narcotics peddling. The cases described are based on actual cases. One case is described all the way from the commission of the crime through the trial in court; the others from the crime through the laboratory investigation. The film is of interest to law enforcement people, the legal profession, service organizations and educated laymen.

HONORS: 14th Annual Columbus Film Festival, Ohio; 10th International Exhibition of the Scientific—Didactic Film, Padua, Italy.

0236
OAK RIDGE RESEARCH REACTOR (1958). 20 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

Summarizes the components, facilities, uses, and operation of the Holifield Research Reactor, a tank type, heterogeneous reactor, immersed in a pool, designed to operate at 20 to 30 Mw.

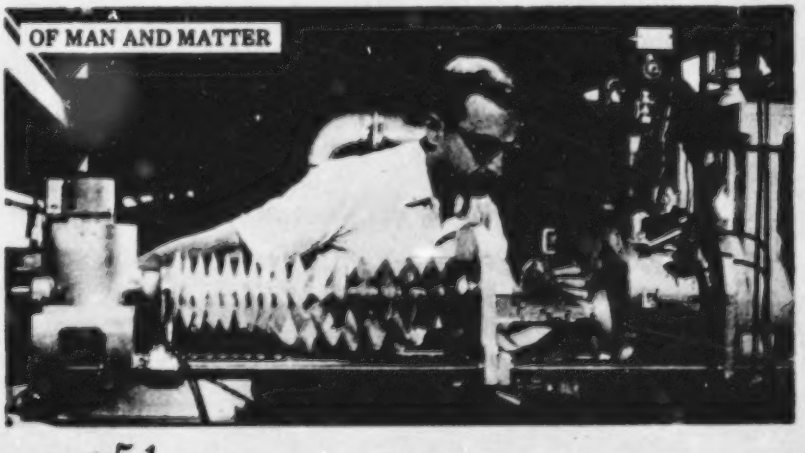
0238
OF MAN AND MATTER (1963). 29 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Describes the design, development and operation of the alternating gradient synchrotron (AGS) at ERDA's brookhaven National Laboratory, shows the various major components of this 33 billion-electron-volt particle accelerator, and explains how the high energy protons produced in the machine are used in physical research. An actual experiment is seen, in which the particle beam is guided into a bubble chamber and the resultant interactions with the target nuclei are photo-

THE NUCLEAR WITNESS



graphed. The methods adopted in scanning and analyzing the photographs are also shown. By means of a brief lecture, a Brookhaven physicist explains that such gigantic and complex machines as the AGS are necessary in order to study the fundamental particles and the forces within the atomic nucleus that are the basic components of all existing matter.

ORDER BY FILM NUMBER AND TITLE

0496
ON THE MOVE (1974). 28 minutes, color.

Suitable for Understanding Level-3.

NOT CLEARED FOR TV.

Public interest in nuclear shipments is increasing every day. This film, produced for educated-lay-level, industrial and technical audiences, explains many aspects of packaging and shipping radioactive materials, including the extreme concern for safety in normal and accident environments.

To gain perspective on the present quantities of shipments which involve radioactive materials, the film compares the nearly one million annual shipments of these materials with 20 billion shipments each year of other hazardous materials like gasoline, propane, pesticides and explosives. Of the one million radioactive material shipments, 95% involve small or intermediate quantities—principally radiopharmaceuticals. The preparation of packages is demonstrated, and damage is shown from shipping accidents, with an explanation of the consequences.

Much of the film explains the package testing program for the highly radioactive materials and the accident environment that accident-resistant packages are designed to protect against. Actual "torture" tests for packages and models are described. Some accidents involving casks are pictured, which demonstrate the successful performance of these designs under severe conditions.

0250
OPPORTUNITY UNLIMITED: FRIENDLY ATOMS IN INDUSTRY (1962). 28 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

This film, narrated by news commentator John Daly, surveys the widespread use of radioisotopes by American industry to make better products—from ships to nylon hose—more efficiently and with an impressive record of safety. By means of animation and live action, the film explains what radioisotopes are and how they are used to (1) measure and control the thickness of sheet materials, (2) measure densities of materials, (3) control product quality, (4) increase flexibility and mobility of industrial radiography (taking X-ray type pictures to assure safe construction), and (5) act as tracers to follow physical movement and chemical reactions. Examples are given of thickness gauges of nylon cord-rubber ply for automobile tires, sheet plastic, and cord-rolled alloy sheets for computers and space-age instruments, as well as examples of gauges which measure densities without shutdown (such as gauges that measure sugar content in applesauce, fat content, and moisture content in soil) and which measure the level of liquids in cans. Industrial radiography with radioisotopes is illustrated with the work on submarines.

0506
THE PARK (1975). 28 minutes, color.

Suitable for Understanding Level-2.

CLEARED FOR TV.

A living wilderness side by side with industry in South Carolina is an ideal laboratory for environmental research for scientists from Universities, foundations and other government agencies . . . scientists who can conduct a wide range of long-term, undisturbed experiments and studies. THE PARK examines the character of the on-site nuclear industry, its effect on natural resources and living species around it and the nature, importance and extent of continuing research that began before industry arrived.

In 1972, ERDA's Savannah River Plant was designated the *first* National Environmental Research Park. Since 1950, the Plant's 300 square miles have been the subject of extensive scientific study to define and control the impact of industry on nature . . . in this case, an active industry that produces a variety of much-needed, nuclear materials.

0254
PAX ATOMIS: SNAP-7 TERRESTRIAL ISOTOPIC POWER SYSTEMS (1965). 25 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Summarizes the parallel development of a family of fully shielded thermo-

electric power converters and chemical processing of the radioisotope Strontium-90 fuel. Laboratory procedures are depicted for thermoelectric couple assembly into a compact operating system capable of converting heat energy into electrical current without the need for moving parts.

Fully shielded Strontium-90 fueled, thermoelectric generators, placed into operational service at remote outposts from north of the Arctic Circle to the South Pole, are now proving the feasibility of reliable, unattended electrical power production from heat generated by decay of radioisotopes.

Installation of the SNAP-7 generator family—to power unattended weather stations in Antarctica and the Gulf of Mexico, navigational aids to shipping in Chesapeake Bay and the Gulf of Mexico, deep sea acoustic research in the Atlantic Ocean—is depicted.

The film concludes with a description of current development work and predictions relating to the next generation of Strontium-90 thermoelectric power supplies for terrestrial uses.

HONORS: Best in Class, Industrial Film Awards Competition, Industrial Photography Magazine, N. Y.

0427
PEOPLE AND PARTICLES (1968). 27 minutes, black & white.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Shows the life, thinking and work of a team involved in a research project in a modern high-energy physics laboratory. You watch experimental physicists, engineers, technicians and graduate students while they prepare for and carry out an experiment using the Cambridge Electron Accelerator at Harvard University.

The film follows the progress of the team as it sets up and tests one of the basic theories of modern physics—quantum electrodynamics. We watch as wide-gap spark chambers are used for detecting and measuring aspects of electron-positron pairs as they traverse on electromagnetic field.

HONORS: First Colloquium of Research & Educational Cinematography, Brno, Czechoslovakia; 6th International Festival of Science Fiction Films, Trieste, Italy; 5th International Festival of Scientific—Technical Films, Belgrade, Yugoslavia.

0411
PERSIMMON: A NUCLEAR PHYSICS EXPERIMENT (1967). 16 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

For several years, the Los Alamos Scientific Laboratory has been using the intense burst of neutrons produced by the underground detonation of a nuclear explosive to perform a variety of nuclear physics experiments. The basic argument in favor of such experiments is that a relatively small nuclear detonation will produce the same quantity of neutrons, in a fraction of a second, that would take a laboratory accelerator hundreds of years to produce. Thus, experiments requiring a very high neutron flux, or a hopelessly long-running time on an accelerator, become feasible with a nuclear explosion as the neutron source. The motion picture presents and discusses the various experiments that comprised the Persimmon event and climaxes with the actual detonation of the nuclear explosive and the consequential collapse and cratering of the ground above it.

0256
THE PETRIFIED RIVER (1956). 28 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

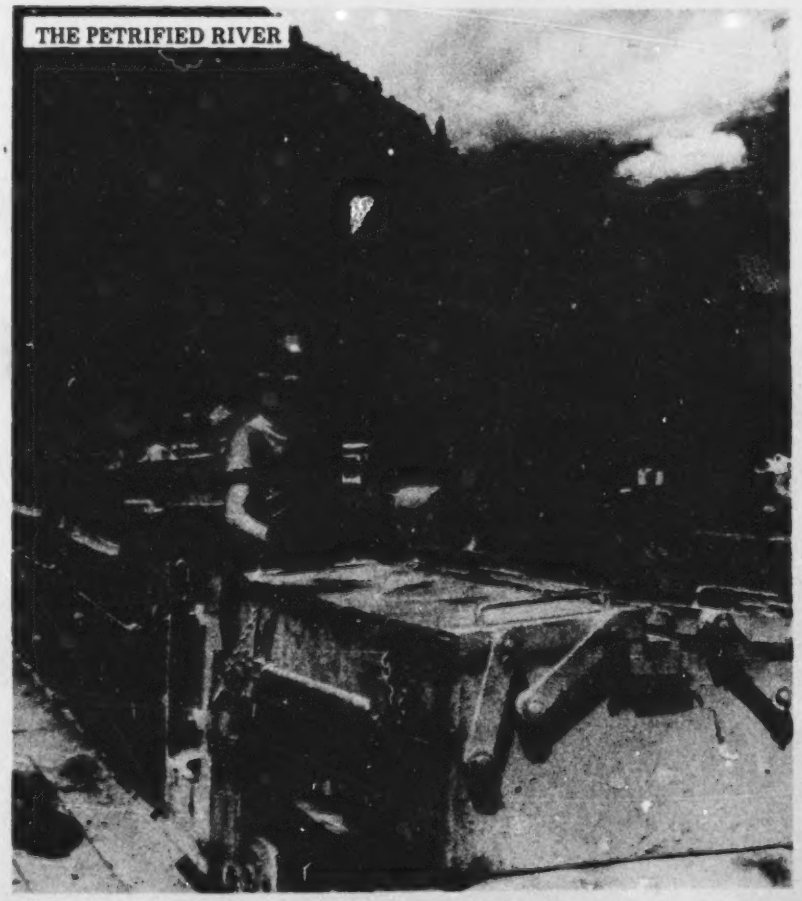
Describe how uranium was deposited during prehistoric, geologic ages; shows early prospecting on the Colorado Plateau; mining and milling of uranium ores; and the use of the atom's energy for power and to produce radioisotopes for medical diagnosis and therapy, agriculture, industry and research.

0260
PLANT GROWTH IN COMPENSATED FIELDS (1967). 7 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Plant growth is controlled by an extremely sensitive mechanism. Even a brief and minute stimulation by gravity, water, etc., will cause the growing portions of the plant to turn toward or away from the stimulus. Since the gravitational force must operate for a "minimum presentation time," it is



possible to neutralize the gravitational field. A mechanical servo-system has been developed by Argonne National Laboratory to neutralize effectively the gravitational effects in all directions. The servo-motors are controlled by a computer program which provides uniform angular distribution, velocity and acceleration.

HONORS: Scientific Film Festival, Lyon, France.

0267
PM-3A NUCLEAR POWER PLANT—ANTARCTICA (1963). 20 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

The film-story of the 1500-kilowatt nuclear power station built, under contract to USAEC, for operation by the Navy at McMurdo Station, Antarctic headquarters for the joint Navy—National Science Foundation Antarctic Research Project. PM-3A, the first atomic power station in the bleak Antarctic, supplies electric power and space heating for the isolated station. Use of nuclear power reduces the massive amounts of fuel oil for generating electricity that must be brought 11,000 miles by American tankers. PM-3A was designed, fabricated, and tested in 14 months. Details are given on the plant's pressure vessel, coolant, nuclear fuel, control rods, switchgear, heat-transfer equipment, turbogenerator, and many other major components. We see shots of the erection and testing of the reactor in the States, site preparation by Seabees in the Antarctic, erection and testing of the reactor at McMurdo, safety aspects, and achievement of criticality.

0501
POWER FROM THE EARTH (1974). 12½ minutes, color.

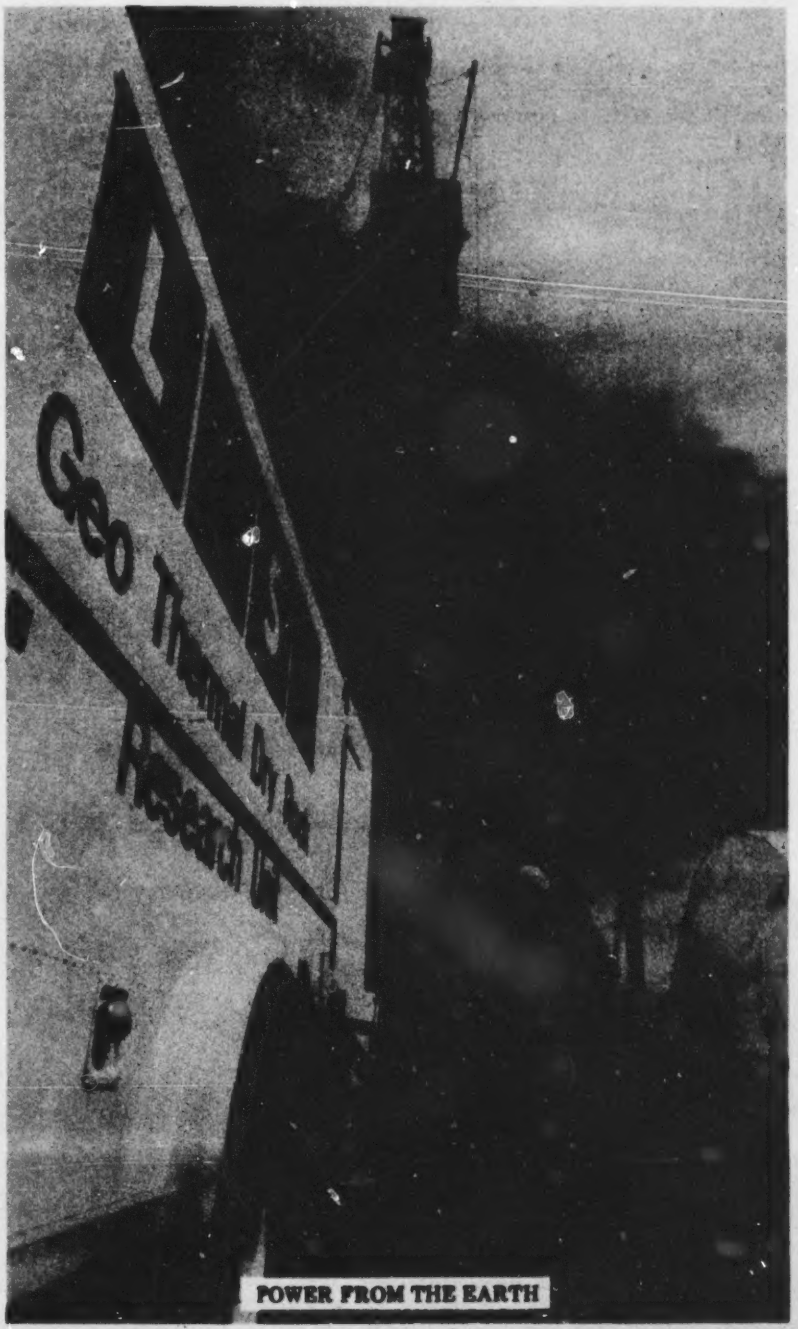
Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

As we see the type of work they are describing, eight scientists, engineers and managers * explain various aspects of obtaining thermal energy from the earth for the production of electric power.

It is possible to drill a well and obtain natural steam. In this country the best potential is in the West. When a well is drilled, dry steam, wet steam, or hot liquid water may be produced, and may help meet national power needs in the future. Pacific Gas and Electric Company is presently developing 300,000 kilowatts of electric power with heat produced from geothermal sources.

In addition to steam and water, hot dry rock and lava are also found. Development must occur where the heat source occurs—near volcanoes or in other areas where magma or lava is near the surface. Heat may be obtained from rocks at 500—1,000 degrees Fahrenheit by injecting water in one hole and removing steam from another, if the rock is sufficiently

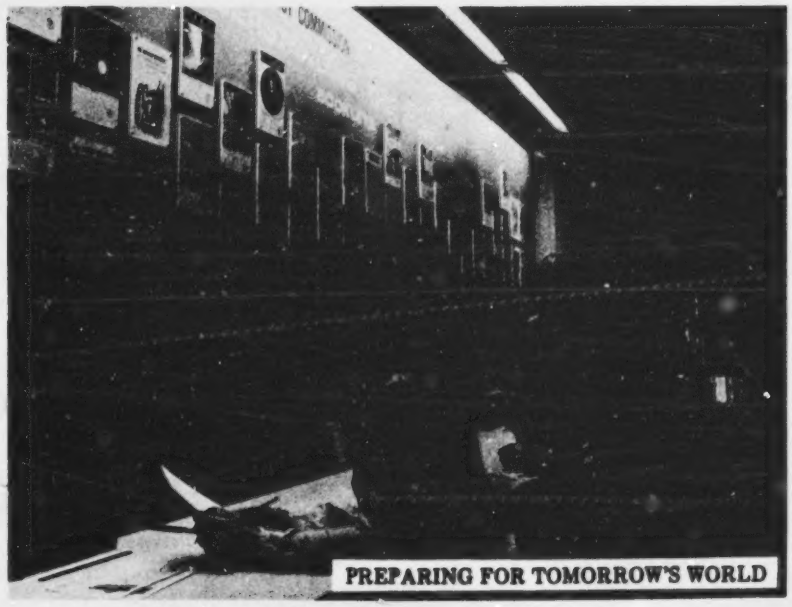


* Dr. Henry Ramey, Engineering, Stanford University; Kenneth Stracke, District Manager Geothermal Division-Big Geysers Field; Dr. George Keller, Colorado School of Mines; Don Stewart, Battelle Northwest Laboratories; Dr. David Blackwell, Geophysics, Southern Methodist University; Dr. William McSpadden, Battelle Northwest Laboratories; Raymond Dominick, State of Montana, Department of Intergovernmental Affairs; Dr. James Kuwada, Rogers Engineering Company.

broken. This method has the potential of economic benefit to local communities and has limited environmental impact. The problem is determining how to use the resource.

Hot fluid systems offer the most immediate solutions, but even with these, problems can occur. Hot brine is more concentrated than sea water and can produce large amounts of salt which may be re-injected into the earth. The Imperial Valley of California has a potential capacity of 20,000 megawatts compared to 34,000 megawatts presently being used by the entire state. Design and materials problems must be overcome because of the erosive and corrosive effect of the brine on pipe and well casing.

Utilization technology for hot, dry rock has not yet been developed and is far more complicated than it sounds. An Energy Research and Development Administration (ERDA) program is aimed at providing basic technology.


PREPARING FOR TOMORROW'S WORLD

0451
PREPARING FOR TOMORROW'S WORLD (1969). 26 minutes, color.

Suitable for Understanding Level-2

CLEARED FOR TV.

Opens in a high school science laboratory with the physics teacher serving as narrator. The student is asked to examine his interests and abilities with a view toward taking his place in the expanding world of nuclear science and nuclear engineering. The value of building a firm foundation in science, mathematics, and English as early as possible in school is stressed. Participation in extracurricular activities, such as school science fairs, is encouraged.

Visits are then made with several students majoring in some aspect of nuclear science or nuclear engineering at different universities across the country. The difficulty in making a career choice is recognized and the student is encouraged to examine all programs offered by the university.

Depending upon one's goal, the student is encouraged to continue his education toward an advanced degree. With the availability of graduate fellowships and other assistance, the financial burden is lightened for most. Although this additional commitment adds to the student's time and cost, there are many factors which make these additional investments very worthwhile.

One of three films in nuclear science and nuclear engineering, produced with the assistance of the American Nuclear Society.

The basic purpose of these films is to motivate students in their formative years to consider careers in the field of nuclear science and engineering. (Use with HORIZONS UNLIMITED, page 33, and YOUR PLACE IN THE NUCLEAR AGE, page 62.)

0280
PRINCIPLES OF THERMAL, FAST AND BREEDER REACTORS (1963). 9 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

This animated film offers an explanation of nuclear fission, the chain reaction, and the control of this reaction in three basic types of reactors. It describes the principles of fast and thermal reactors and introduces the concepts of the moderator and reflector. The breeder principle is described, and plutonium and thorium cycles are indicated. (Use with BASIC PRINCIPLES OF POWER REACTORS, see page 19.)

0415
PROJECT GASBUGGY: THE RESOURCEFUL ATOM (1968). 14¼ minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Man's hope to harness the atom's explosive force for peaceful purposes moved closer to fulfillment deep beneath a plateau in northern New Mexico in December 1967. Government and industry joined forces to study whether nuclear explosions can be safely used to perform massive underground engineering tasks for more efficient recovery of natural resources.

The experiment involved the detonation of a 26-kiloton nuclear explosive (energy equivalent to that released by 26,000 tons of TNT) 4,240 feet underground in a known area of natural gas-bearing sandstone in which the gas is so tightly trapped that recovery by conventional techniques is uneconomic. Principal objective of the experiment was to investigate if the explosive force of the atom could crush and shatter the rock to permit safe and economic recovery of the natural gas.

PROJECT GASBUGGY reports on site preparations, drilling activities, emplacement of the nuclear explosive, installation of safety monitoring equipment, the explosive and drilling

PROJECT GASBUGGY

back to collect gas and rock samples. Art and animation are used to illustrate the test objectives, what takes place underground when a nuclear explosive is fired, and the expected effects of the explosion on the gas reservoir.

HONORS: 6th Review of Scientific, Technical & Educational Films, Pardubice, Czechoslovakia; 4th International Exhibition of the Scientific Film, São Paulo, Brazil; 5th World Festival of Scientific Education & Geographical Films, Teheran, Iran; 13th International Festival of Scientific & Educational Films, Padua, Italy; Scientific Film Festival, Lyon, France; 6th International Exhibition of the Scientific Film, Buenos Aires, Argentina.

0288
PROPERTIES OF RADIATION (1962). 30 minutes.

(From the Understanding the Atom Series)

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Discusses the general problems of radiation decay, such as the laws of radioactive decay, including the concept of half life. Statistical considerations are introduced, and the basic notion of the standard deviation in counts expected in various experiments is described. The energy spectrum from alpha and beta emitters is considered, and the use of absorption curves to study the energy distribution of beta radiation is introduced. The density thickness expressed in milligrams per square centimeter is introduced as a useful term.

The film, designed for a high school senior-level chemistry or physics course, or as an introductory unit in nuclear science at the college level, is presented by Dr. Ralph T. Overman, former Chairman, Oak Ridge Institute of Nuclear Studies.

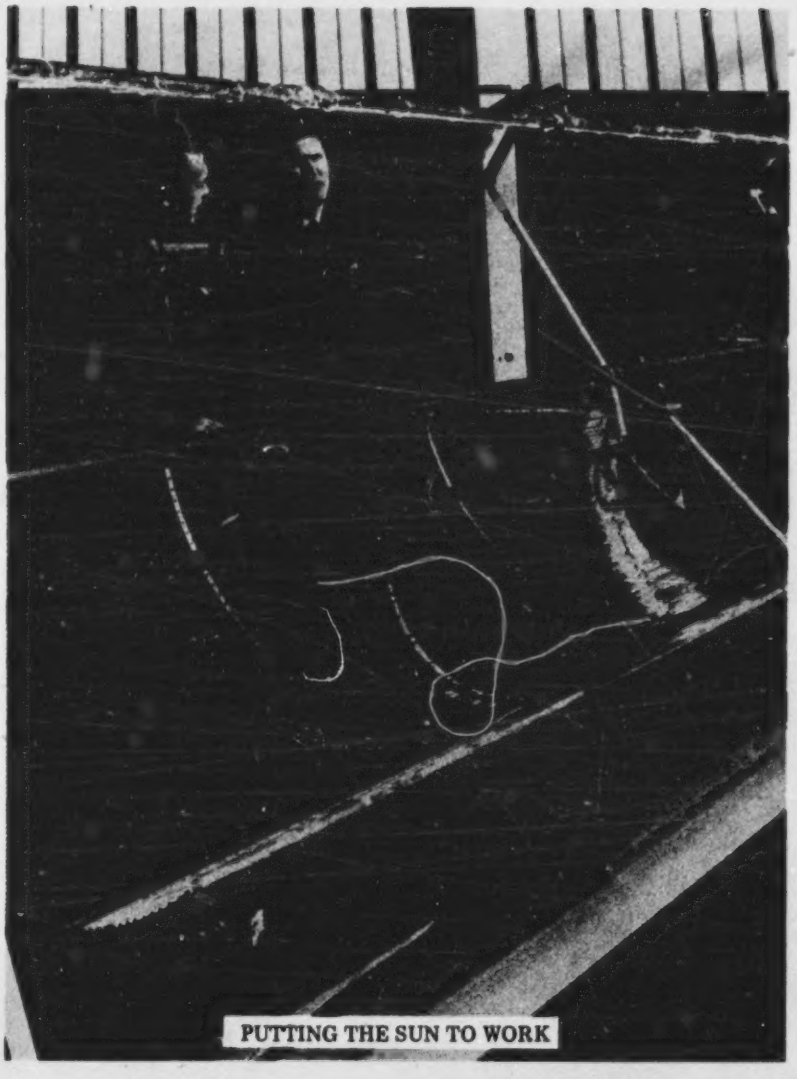
0502
PUTTING THE SUN TO WORK (1974). 5 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

The earth is man's primary source of energy, but this energy was obtained from the sun. Yearly energy production by the sun would satisfy all human needs for more than 10,000 years. Why are we worried about an energy crisis?

Mr. George O. G. Lof, Director, Solar Energy Laboratory, Colorado State University, explains that there is a definite limit to the supply of fossil fuels, and using fossil fuels causes pollution. Plants use solar energy easily, but in order for us to use the sun's radiation directly, we must design special structures and systems to capture that energy. Using his own solar-heated home as an example, Dr. Lof explains that, in one application, solar panels can intercept the sun's energy, which in turn is radiated inward to heat air in a house, which then may be circulated through the house.



PUTTING THE SUN TO WORK

Dr. Aden B. Meinel, Director, Optical Science Center, University of Arizona, states that a key element of the new technology is an optical thin film coating which absorbs sunlight and prevents reradiation and heat-loss, so that the surfaces of a tube become very hot. Research has proceeded, under a National Science Foundation grant, at the University of Arizona. A solar collector presently is used for verification of calculated performance and will lead to development of larger collectors and "power farms" to produce practical quantities of electrical energy from solar energy.

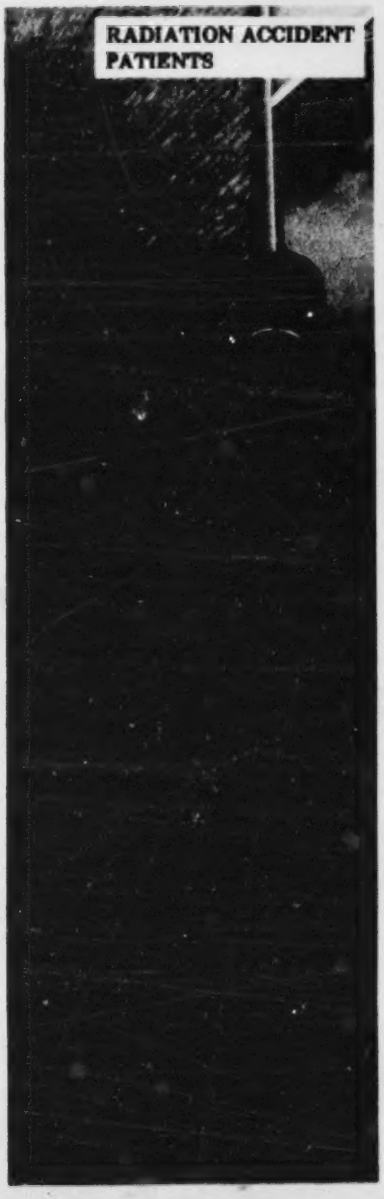
Roger Schmidt, Senior Staff Scientist, Honeywell Inc., explains that the problem is one of engineering design and fabrication. Honeywell and the University of Minnesota are building modular components which can be easily placed and maintained in the solar field. Also, there is work toward improving structure and function of components to reduce cost, so that people will be able to afford them. Solar-thermal power plants are one of a variety of approaches that researchers are taking toward the goal of putting the sun to work.

0442
RADIATION ACCIDENT PATIENTS (1969). 17 minutes, color.

Suitable for Understanding Levels-2 and -3.

NOT CLEARED FOR TELEVISION.

The film is designed for the training of rescue workers, nurses, therapists, hospital administrators, physicians, police and firemen. It emphasizes that, despite the outstanding safety record of the nuclear energy industry, the anticipated rapid growth of atomic workers in the next decade could result in an increase of incidents involving possible radioactive contamination, which can be effectively and safely handled within existing medical facilities.



In a series of simulated action episodes depicting accidents, the film shows the techniques for proper handling of radiation accident patients; how to use simple detection instruments; radiation injury aspects of first aid. Based on the credo, "Never let fear compromise good medicine," the film points out that the unfounded fears of some medical and paramedical personnel of radiation and possible contamination must not be allowed to close the door on assistance to radiation patients. The film helps audiences understand that radiation cases have parallels in routine rescue squad and hospital experiences.

HONORS: 27th National Committee on Safety, Chicago, Illinois; Gold Medal, International Festival of Occupational Safety and Health Films, Belgrade, Yugoslavia; 3rd International Film Festival of Prevention (Labor Accidents), Oporto, Portugal.

0291
RADIATION AND MATTER (1962). 44 minutes.

(From the Understanding the Atom Series.)

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

The film, which considers the interaction of radiation with matter, develops the various processes by which alpha, beta, and gamma radiation give up energy to their surroundings. The similarities and differences of alpha and beta particles are considered, with emphasis on the methods by which ionization occurs. It is pointed out that, since the interaction of radiations in the absorption process takes place essentially only with orbital electrons on the atoms, the density of electrons in matter is the determining factor. The relation between energy of a particle and the number of ion pairs formed is also explained. The lecturer follows with a discussion of gamma, or electromagnetic radiation, which is described as a nonionizing event in terms of the initial interaction between photons and atoms. Four possibilities of gamma-ray absorption (excitation, photoelectric effect, Compton effect, and pair production) are discussed. The viewer, however, is alerted to the fact that there is only a certain probability that one particular process may take place rather than another, depending upon the energy of the gamma ray. This probability, expressed as absorption coefficient, is then related to each of the four absorption processes.

A lecture film designed for a high school senior-level chemistry or physics course, or as an introductory unit in nuclear science at the college level, presented by Dr. Ralph T. Overman, former Chairman, Oak Ridge Institute of Nuclear Studies.

0292
RADIATION AND THE POPULATION (1962). 29 minutes, black and white.

(From the Challenge Series.)

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Because genetic damage is one of the most serious effects of radiation, the U. S. Atomic Energy Commission genetics program is designed to learn how radiation damages cells and what the long term effects of such damage might be. The film explains how radiation causes mutations and how these mutations are passed on to succeeding generations. Mutation research is illustrated with results of experimentation on generations of mice and includes discussion of work with fruit flies and induced mutations. Fallout and its implications are also discussed. The film provides an in-depth description of basic research in the nuclear sciences at ERDA's Argonne National Laboratory.

0293
RADIATION DETECTION BY IONIZATION (1962). 30 minutes, black and white.

(From the Understanding the Atom Series.)

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

The basic principles of ionization detectors are described, particularly in relation to the pulse height as a function of voltage curves. Brief descriptions of ionization chambers, proportional counters, and Geiger counters are included, and examples of instruments operating in these regions are shown. Special consideration is given to Geiger counters, including the mechanism of gas quenching and the determination of a counting-rate plateau. The resolving time of a counter is discussed, as well as various components of a practical instrument, including amplifiers and scalers.

A lecture film designed for a high school senior-level chemistry or physics course, or as an introductory unit in nuclear science at the college level, presented by Dr. Ralph T. Overman, former Chairman, Oak Ridge Institute of Nuclear Studies.

ORDER BY ITEM NUMBER AND TITLE

0294
RADIATION DETECTION BY SCINTILLATION (1962). 30 minutes, black and white.

(From the Understanding the Atom Series.)

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

A short review of gamma interactions with matter is shown, with particular reference to useful scintillation crystals. The scintillation process is described, and the efficiency of the conversion of gamma radiation to visible light in the scintillator is discussed. Solid and liquid scintillators are shown along with special detection devices using this principle. A description of the operation of a photomultiplier tube is given, and the concept of pulse height is developed. The principle of operation of a pulse-height analyzer is shown, and the spectrum obtained with such an instrument is shown and discussed. Brief mention is made of solid-state radiation detectors.

A lecture film designed for a high school senior-level chemistry or physics course, or as an introductory unit in nuclear science at the college level, presented by Dr. Ralph T. Overman, former Chairman, Oak Ridge Institute of Nuclear Studies.

0295
RADIATION EFFECTS IN CHEMISTRY (1964). 13 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

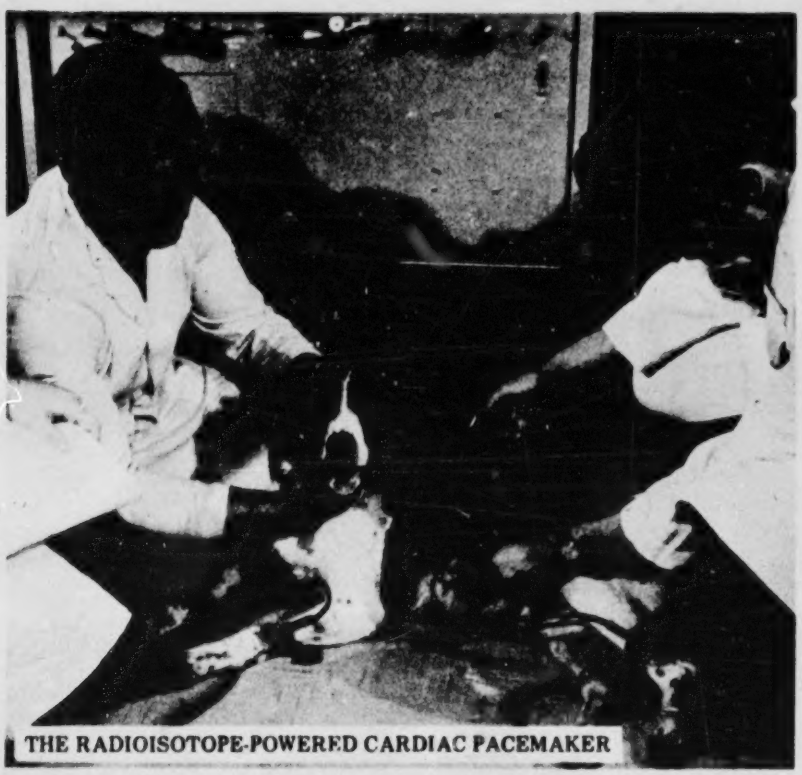
Explains that radiation initiates a wide variety of chemical reactions. But the fundamental mechanisms which produce these effects are still under investigation. Within a few nanoseconds after irradiation, a variety of chemical substances are produced which are then available to participate in subsequent reactions. The experimental study of this process requires extremely sensitive and high-speed techniques—spectrometry, electron spin resonance techniques, etc.

0296
RADIATION IN BIOLOGY: An Introduction (1962). 13½ minutes, black and white or color.

Suitable for Understanding Level-2.

NOT CLEARED FOR TELEVISION.

Explains the meaning of high-energy radiation and shows how this radiation is used in biological research. Briefly reviews light from the sun (wave radiation), radio waves, x rays. Also touches on the various sources of radiation (x-ray machines, nuclear reactors, cosmic rays, the sun, etc.). Radioisotopes are defined, and their life is traced from production through their use as tools in the study of radiation damage. The effect of radiation on living cells is demonstrated by comparisons of plants grown from irradiated and nonirradiated seeds and of mice that had been irradiated with those that had not been irradiated. The film also shows the effects of radiation on bone marrow, on the protective lining of the intestine, and on chromosomes (mutations). The use of radioisotopes to trace chemical processes in plants (the absorption of nutrients) is also covered. Autoradiographs are explained, and the function of a Geiger counter is outlined.



THE RADIOISOTOPE-POWERED CARDIAC PACEMAKER

0470
THE RADIOISOTOPE POWERED CARDIAC PACEMAKER (1971). 21½ minutes, color.

Suitable for Understanding Level-3.

NOT CLEARED FOR TELEVISION.

One of the relatively common diseases that disrupts a normal heart is "heart-block." This occurs when the natural pacemaker of the heart no longer generates the required electrical impulses to contract the ventricles. There are presently more than 40,000 persons in the United States who have been greatly assisted by the use of battery-powered artificial heart pacers and each year an additional 5,000 patients receive such devices.

In three years the former U. S. Atomic Energy Commission in collaboration with the National Institutes of Health successfully developed an isotope powered pacemaker. The nuclear pacer promises a lifetime of ten years or more and removes the risk and expense of frequent surgical replacement experienced with battery powered pacers. This film depicts the entire fabrication and lifetime testing of the nuclear powered pacer and witnesses one of the complete implantations of the device in a dog at the National Institutes of Health.

HONORS: Chris Certificate in Medicine, 19th Columbus Film Festival, Ohio.

0304
RADIOISOTOPE SCANNING IN MEDICINE (1965). 16 minutes, color.

Suitable for Understanding Level-2.

NOT CLEARED FOR TV.

Development of scanning equipment in combination with new radioactive drugs has produced important advances in medical diagnosis. Radioac-

tive tracers give off signals that can be converted into an image. Administered to patients, these radioactive materials, in effect, make pictures revealing valuable information about the size, shape, position and functioning of lungs, thyroid glands, bones, liver, kidneys, heart, spleen, and brain. The signals emitted from the organ-selective atomic tracers are registered by a scintillation detector which moves over the test area on the patient. This motion picture explains the methods of organ scanning and gives examples: thyroid and lung scanning with radioactive iodine. Scans are also shown of the chest, brain, liver, and kidneys. Visualization of the malfunctioning of human organs is produced in black and white or in color on paper and/or on photographic film. The radiation detection and print-out devices are described.

0306
RADIOISOTOPES IN BIOLOGY AND AGRICULTURE (1964). 26 minutes, black and white.

(From the Understanding the Atom Series.)

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

This film is a lecture by Dr. Howard Curtis of Brookhaven National Laboratory who touches on some of the up-to-date applications of atomic energy to biology and agriculture. Reference is made to the importance of radioisotopic tracers in the determination of the structure and role of nucleic acids and other cellular components. This work is done either with various types of counters or autoradiography. For example, the position of DNA in the cell has been determined quite specifically. This information has been exceedingly important in the breaking of the genetic code by determining the area of the subunits on the backbone of the genetically important molecules. Similarly, the structure of proteins has been determined using radioactive tracers. In addition to tracer applications, a great deal of information has been gained by studying radiation effects. Interesting examples of plant breeding projects are shown. In the animal sciences, important information on the study of aging has come out of the use of radiation as a stress. Various theories of aging have been tested, and it appears that aging is primarily associated with the damage to chromosomes. If the DNA is damaged, animals grow older because of basic instability of DNA. Other examples of the importance of radiation to molecular biology are shown.

A lecture film designed for a high school senior-level chemistry or physics course, or as an introductory unit in nuclear science at the college level, presented by Dr. Ralph T. Overman, former Chairman, Oak Ridge Institute of Nuclear Studies.

0310
RADIOLOGICAL SAFETY (1963). 30 minutes, black and white.

(From the Understanding the Atom Series.)

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Examines the field of radiological safety or health physics, and tries to give a basis for a perspective on potential biological radiation damage. It first considers background radiation and the nature of the difference in this radiation. Larger doses of radiation can be a potential cause of both somatic (direct bodily) damage and genetic (hereditary) damage, and consideration is given to the maximum permissible limits or radiation guide levels which have been established by various radiological protection committees and the Federal Radiation Council. Various units are described, including the roentgen, the rad, and the rem. The latter unit is a measure of the biological dose equivalent and considers the relative biological effectiveness (RBE) of the radiation. Consideration is also given to the maximum permissible concentration of radioisotopes in water or air, and the problems involved in the localization of radioactive materials in the body. Various factors that must be controlled in reducing the radiation hazard include the quantity of radioactive material, the distance, the time of exposure, and shielding. Internal exposure must be minimized by the use of special laboratory facilities and techniques which are required to minimize the admission of radioactive isotopes into the body. The importance of having calibrated instruments available is stressed in any program involving the use of radiation sources.

A lecture film designed for a high school senior-level chemistry or physics course, or as an introductory unit in nuclear science at the college level, presented by Dr. Ralph T. Overman, former Chairman, Oak Ridge Institute of Nuclear Studies.

0312
R-A-P: RADIOLOGICAL ASSISTANCE PROGRAM (1965). 26½ minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Shows the readiness and proficiency of radiological assistance teams in various re-enacted instances of emergencies for audiences concerned with problems in dealing with radioactive materials.

The R-A-P team's effectiveness is shown to be dependent on the cooperation of other groups and individuals at different levels of government and business. To illustrate this, there are three main stories in the film. The first traces the hunt for a radioactive source lost from a small industrial plant. The trail, via helicopter and police cars, takes the R-A-P team to a municipal dump. The second case is the problem of leaking radioactive vapor from a sealed system in a research laboratory. The third is the story of a fire in a uranium products plant that gives a R-A-P team the additional public information job of coping with a community which mistakenly assumes it is threatened with a disaster.

Since, despite every safeguard, accidents do happen—detailed reenactments in this film of the steps and measures taken to deal with these radiological emergencies show the operations of R-A-P teams as they put to work their specialized professional skills and equipment.

HONORS: Safety on the Screen, N. Y. Safety Council; Gold Medal, International Festival of Occupational Safety and Health Films, Belgrade, Yugoslavia; 3rd International Film Festival of Prevention (Labor Accidents), Oporto, Portugal.

0314
REACTOR SAFETY RESEARCH (1964). 15 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

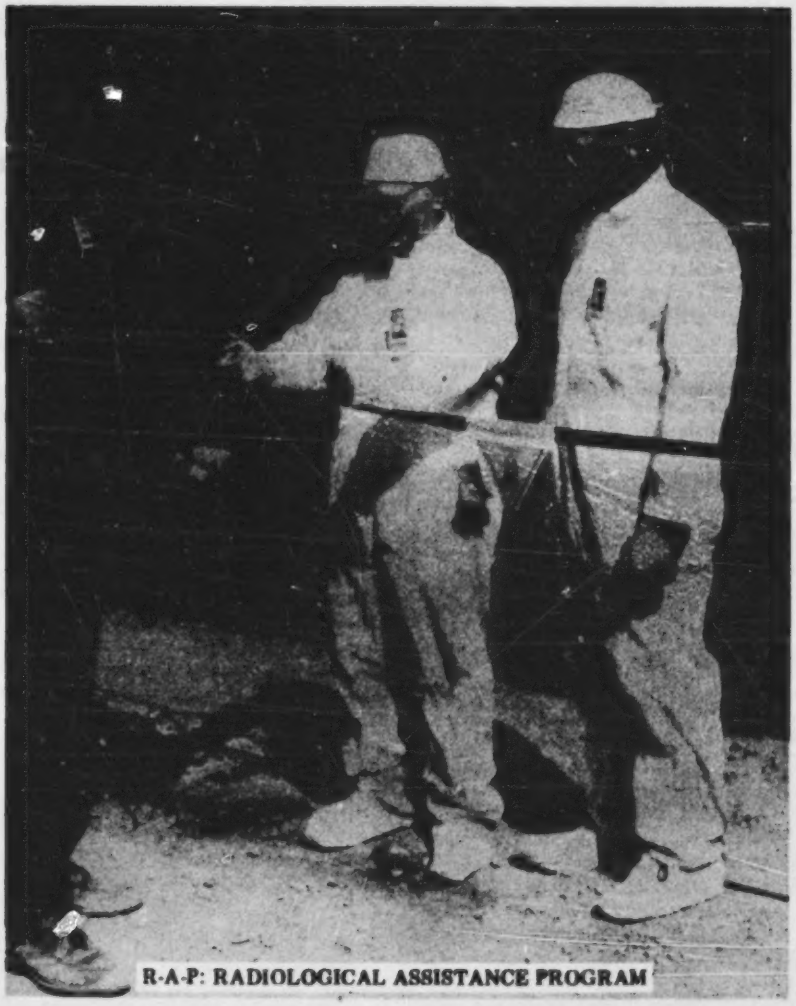
Shows that conservative design is characteristic of nuclear power reactors, with elaborate safeguards to prevent the improbable accident. It points out that through reactor safety research the mechanisms of abnormal behavior, fission product release, chemical reactions, containment, and vapor cleanup systems are better defined, providing a basis for improvement in design features and reduction of costs.

0425
RESPONSE TO MECHANICAL SHOCK (1968). 18 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

Illustrates several types of mechanical shock and shows the shock signature (acceleration as a function of time) generated by each shock. Through



R-A-P: RADIOLOGICAL ASSISTANCE PROGRAM

animation, the parameters used to define mechanical shock are shown: acceleration, velocity, and displacement, and the relationship and interdependence of these three functions are explained. The film illustrates the concept of a single-degree-of-freedom model, and shows how three different degrees of damping affect motion of the spring-mass system during shock response. With animated drawings, the film illustrates how the amplitude and duration of a shock affect the response of a single-degree-of-freedom system; how shock response spectra for simple and complex shocks are derived; how shock response spectra may be used. (See also, FUNDAMENTALS OF MECHANICAL VIBRATION, page 30.).

HONORS: 14th International Exhibition of Scientific and Educational Films, Padua, Italy.

0456
RETIREMENT OF THE HALLAM NUCLEAR POWER FACILITY (1970). 35 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

This technical film shows the implementation of the plan for decommissioning the 254 Mwt sodium cooled graphite-moderated nuclear power reactor located at Nebraska Public Power District's Sheldon Station. The accomplishment of the retirement left the remaining structures non-hazardous and completely contained with no requirements for licensing or maintenance. Stressing the safety procedures necessary for the handling of sodium and radioactive materials, the film shows disposal of irradiated fuel, disposal of bulk sodium, reaction of residual primary sodium, disposition of contaminated material, removal of reusable equipment, demolition of the reactor building, and sealing of reactor and remaining structures.

ORDER BY FILM NUMBER AND TITLE

0322
RETURN TO BIKINI (1966). 28½ minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Describes the latest scientific survey by a team from the Laboratory of Radiation Biology of the University of Washington to determine the condition of Bikini and Eniwetok atolls six years after the last nuclear test detonations, and how it is found that there has been tremendous recovery to the biological processes that form the life chain linking man with the tiniest plants, fish and animals in the atolls. Scientists have been studying the biological after-effects of nuclear tests at the mid-Pacific atolls intermittently since 1946. Returning in August 1964, the scientists find that the islands are once again lush with vegetation, ex-

RETURN TO BIKINI

ternal radiation levels have dropped to levels safe for people and the radioactive burdens in animals and plants are low, rainwater in the soil is safe for drinking, coconut trees are increasing again, all the expected species of fish and sea life are to be found, birds are thriving, and that the sea—surging through the coral reefs—has cleaned, restored, and nourished the atolls. Conclusion: the gross results of nuclear testing are fading, and what little biological damage remains is rapidly healing.

HONORS: 5th International Agricultural Film Festival, Trieste, Italy; 15th Annual Melbourne Film Festival, Australia.

SAFETY—SECOND TO NONE

ORDER BY FILM NUMBER AND TITLE

0324
THE RIDDLE OF PHOTOSYNTHESIS (1965 Version). 14½ minutes, color.

Suitable for Understanding Level-2.

NOT CLEARED FOR TV.

Shows role of photosynthesis in growth of food and use of radiocarbon to explore the process. Describes, with animation, key steps in one of the experiments designed to help solve the riddle.

Photosynthesis is the process by which plants use sunlight, water, minerals and carbon dioxide from the air to release oxygen and to form foods such as sugars, starches, fats and proteins. Better understanding of the process may lead to the production of food by chemical methods. In the film, algae, one-cell plants, are submitted to a series of different light exposures to determine chemical changes in relation to exposure time.

HONORS: 5th International Festival of Science Fiction Films, Trieste, Italy; 7th International Agricultural Film Festival, Trieste, Italy.

0325
ROUNDUP (1960). 18¼ minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Describes the use of radiation to eradicate the screwworm fly in the southeastern United States, an insect pest that had caused large losses to livestock owners. The screwworm fly deposits its eggs in a cut or insect bite on the skin of a warm-blooded animal. The eggs hatch to worms that feed on live flesh and then fall to the ground, where they burrow into the soil and change to pupae. Ten days later the fly emerges and mates, and the cycle continues. The film shows typical cases of screwworm infestation. Entomologists suggested that since screwworm flies mate only once, if a method of sexually sterilizing flies could be found, eradication was possible. Since x ray was too expensive, radioactive cobalt (^{60}Co) was selected to do the sterilization job. The plan was tested on the tiny island of Curaçao, where sterilized male flies were released from aircraft. In six months the pest was eliminated. Similar operations were followed in Florida and other southeastern states. A huge screwworm factory was built in Florida, where 50 million flies were reared and sterilized in a week with pupae subjected to 8000 roentgens of gamma rays. Ten million sterilized male flies were airdropped on infested areas. Eventually the screwworm fly was brought under full control and largely eradicated.

HONORS: 2nd International Fishing and Hunting Film Festival, Yugoslavia; "Golden Rocket," 16th International Nuclear Congress, Rome, Italy; Golden Eagle, CINE (Council on International Nontheatrical Events), Washington, D. C.

ORDER BY FILM NUMBER AND TITLE

0443
THE SAFE HANDLING OF ENRICHED URANIUM (In an ERDA Production Plant) (1969). 22 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

Filmed primarily at the ERDA Y-12 Plant in Oak Ridge, the motion picture introduces new employees in nuclear production plants to the concept of nuclear fission and criticality, and explains the reasons for safety procedures that are observed in the handling of enriched uranium and other fissionable materials. The film will be understood by persons with or without a technical background. Its contents include: an animated sequence which explains the difference between U-238 and U-235, and the concepts of nuclear fission and criticality; a brief summary of the uses of enriched uranium; animated sequences explaining how criticality may be prevented by proper handling procedures; scenes of persons working with U-235 in various forms (gas, powder, metal, liquid) in several work areas; emergency procedures; and a few scenes of U-233 and plutonium work areas.

0498
SAFETY—SECOND TO NONE (1974). 14½ minutes, color.

Suitable for Understanding Levels 2 and 3.

CLEARED FOR TV.

As more nuclear power plants are put into operation by electric utilities throughout the U. S., some fears have been expressed about safety. This film explains that, as the watchdog over the nuclear power industry, the Government takes great care to see that plants are made extraordinarily safe, that no shortcuts are ever taken that might threaten the public, and that emphasis is placed on quality in design, construction and operation.

Experts* on radiation and engineers at nuclear power plants make these points: that a nuclear station cannot blow up like an atom bomb, that the tiny amounts of radioactivity that may be released from the plants are controlled to low and safe limits, that the radiation exposure that people would receive from a nuclear plant is only a small fraction of natural background radiation—the radioactivity in the air, in the ground, in our homes and in the very food we eat.

One expert explains that normal nuclear power generation produces less risk to the public from radiation in an entire year than the risk from radiation from a single jet flight coast to coast. There are multiple layers of protection built into every nuclear plant, so that if one safeguard fails, there would be others to protect the public. The safety features include thick concrete walls and domes. Plants are designed to withstand earthquakes, floods and hurricanes.

The Government has spent $250 million in reactor safety research and will continue to see that every plant generating power meets the stringent safeguards established for the life of the plant.

0333
SANDIA SPINOFF (1967). 15 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Demonstrates how high reliability requirements in the U. S. nuclear weapons program have resulted in scientific developments at ERDA's Sandia Laboratory which have peaceful-"spinoff" applications for hospitals, industry, etc. Examples shown: laminar air flow, a technique which creates ultra-clean environments for any medical or industrial application where protection is needed from airborne contamination; ion plating, a new method of plating which creates extremely tight bonds between previously incompatible metals; and ACCEL (Automated Circuit Card Etching Layout). See ACCEL REVISITED, page 11).

*Dr. Roger E. Linnemann, President, Radiation Management Corp.; Dr. Norman C. Rasmussen, Professor of Nuclear Engineering, M.I.T.; Dr. Victor P. Bond, Associate Director, ERDA's Brookhaven National Laboratory; Dr. Lauriston S. Taylor, President, National Council on Radiation Protection and Measurements; Dr. Herbert Kouts, Director, Division of Reactor Safety Research, NRC.

HONORS: CINE Golden Eagle International Award, Washington, D. C.; One of the "Most Honored Pictures of the Year," Business Screen, Chicago.

0335
THE SCINTILLATION CAMERA (1964). 10 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

In order to visualize the location of gamma-emitting isotopes within the human body for medical diagnostic purposes, the scintillation camera was developed at the Donner Laboratory. Using animation, this technical film describes this equipment and explains the application of the method for studying thyroid and kidney function disorders. It also describes a modified apparatus for use with positron emitting isotopes which has been developed and finds a particular advantage in diagnosis of brain tumors.

0491
A SEA WE CANNOT SENSE (1973). 27½ minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Everything in nature can be seen or felt—wind, light, cold, texture—that is everything except radiation. This is "A SEA WE CANNOT SENSE."

Low-level radiation that thoroughly suffuses our environment—much of it coming from cosmic rays from outer space—is in the earth, the rocks, the waters, the air, even in man himself. The amount varies in different places and under differing conditions. We have instruments that detect all kinds of radiation and thoroughly measure and record it. The film shows where natural background radiation comes from, where the natural buildup is three to twenty times more than in the United States. The radioactive difference of residing in a wooden house is compared with a concrete house.

Low-level radiation as used in medicine and dentistry is also discussed, as are the effects of chest x-rays, television sets, nuclear power plants and weapons testing.

The determination of Federal Radiation Protection Standards is made by outstanding experts in radiology, genetics, biology and health physics. The film shows how background as well as man-made radiation has been studied and examined more thoroughly than any other potentially hazardous substance in man's environment, and how these standards originally set in 1929 are now amended and enforced.

A SEA WE CANNOT SENSE is a popular and impressive treatment of a little-known subject—low-level radiation, which has been here on earth long before man and has been part of the natural environment as all life has developed on this planet.

HONORS: American Film Festival, New York City, New York; 2nd Birmingham Film Festival, Birmingham, England; 23rd International Festival of Mountain and Exploration Films, Trents, Italy.

0336
SEARCHING FOR THE ULTIMATE (1962). 29 minutes, black and white. (From the Challenge Series.)
Suitable for Understanding Levels-2 and -3.
CLEARED FOR TV.
Atomic structure, one of the most basic forms of nuclear research, permits the scientist to discover the nature of the universe through the use of atom smashers or particle accelerators. The machines produce intense beams of radiation which enable study of the structure of the atom, the nucleus, and the basic components of the nucleus. This film explains how accelerators operate and shows one of the world's largest particle accelerators being constructed. Sub-nuclear particles and the concept of matter and anti-matter are also explained. The film provides an in-depth description of basic research in the nuclear sciences at ERDA's Argonne National Laboratory.

0339
SHEAR-LEACH PROCESS FOR SPENT NUCLEAR FUELS (1966). 11 minutes, color.
Suitable for Understanding Level-3.
CLEARED FOR TV.
Illustrates the development at ERDA's Hollifield National Laboratory of the Shear–Leach Process, a mechanical method for reprocessing spent stainless steel or Zircaloy-2 clad power reactor fuels. The various parts of the equipment are portrayed, as well as the operation of the Shear–Leach with unirradiated fuel. The film also summarizes data obtained from various shearing and leaching tests conducted at Hollifield National Laboratory.

0471
SHORT-LIVED RADIOISOTOPES IN NUCLEAR MEDICINE (1971). 27 minutes, color.
Suitable for Understanding Level-3.
CLEARED FOR TV.
The recent surge in the use of radioisotopes in nuclear medicine owes much of its impetus to the development of new improved scanning instrumentation.

The film describes the development of a Technetium-99*m* generator at Brookhaven and its medical application at the Argonne Cancer Research Hospital. It also touches upon the more recent methods of producing new experimental short-lived isotopes in High Flux Reactors and medical cyclotrons. The refinement of radioisotope scanning techniques is also discussed, and capsule reports are made on the Mark III brain scanner, the 16-inch Anger camera, and the depth perception ability of the multiplane tomographic scanner. All these refinements offer the physician a better diagnostic picture faster and with the lowest radiation burden to the patient.

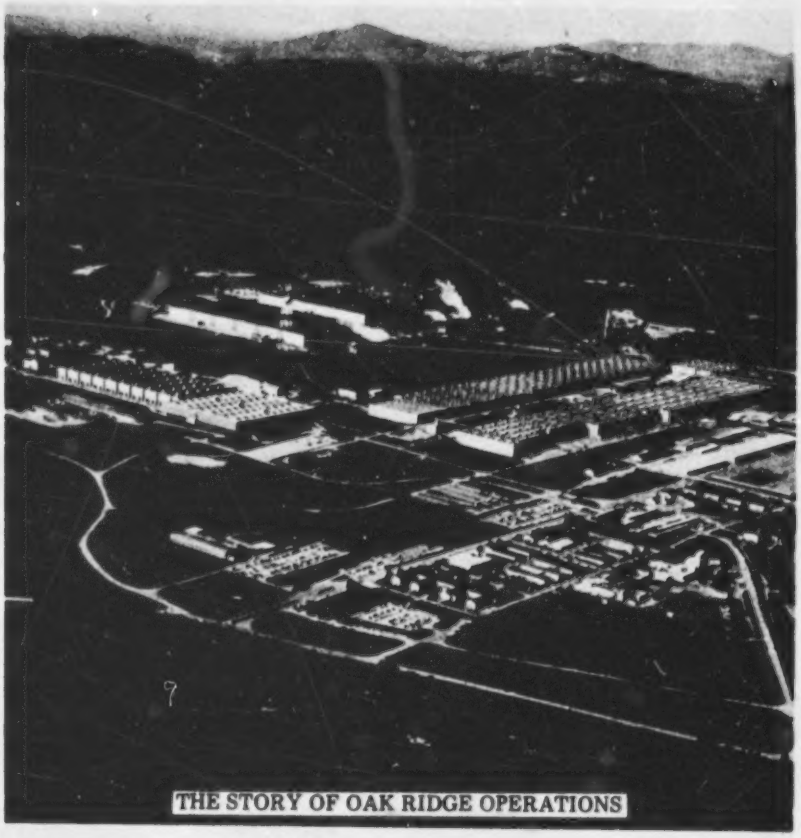
0343
THE SL-1 ACCIDENT, PHASES 1 AND 2 (1962). 40 minutes, color.
Suitable for Understanding Level-3.
NOT CLEARED FOR TV.
This semitechnical film on the SL-1 accident at the National Reactor Testing Station, Idaho, was produced primarily for studying and improving the methods and techniques of handling nuclear emergencies. A combination of actual and reenacted scenes, the film presents a concise résumé of what happened and how the former U. S. Atomic Energy Commission and its operating contractors reacted to the situation, i.e., the activities associated with Phases 1 and 2 of the postaccident operations. Phase 1 involved the location, rescue, and recovery of the three personnel and the determination of how much contamination had been released to the environment. Phase 2 involved determining whether the reactor was nuclearly safe. Results of the investigation of the accident indicate a need for readily available high-range survey instruments, careful use of health physicists, preplanning, etc.; in addition, important information on reactor technology and the administrative procedures governing reactor development has resulted. Brief information is given on the start of Phase 3 work, involving the decontamination and disassembly of the reactor to determine what destroyed it. This is detailed in THE SL-1 ACCIDENT, PHASE 3, described below.

0344
THE SL-1 ACCIDENT, PHASE 3 (1962). 57 minutes, color.
Suitable for Understanding Level-3.
NOT CLEARED FOR TV.
This is a sequel to "The SL-1 Accident, Phases 1 and 2." It is a factual and historic documentary report on what was done with the SL-1 reactor and building commencing about four months following the accidental nuclear excursion that occurred January 3, 1961. It features a step-by-step reenactment of the accident, animation of the events believed to have taken place during and immediately following the excursion, and a postulation of the cause. The film documents substantially the recovery operations specified under contract with General Electric Company, which was charged with: gathering evidence pertaining to the accident; preparing the facility for core removal; recovery of the reactor core for remote-control examination; demolition of the reactor building; decontamination of the SL-1 site and restoration to habitable status; and presentation of an accident analysis report to the former U. S. Atomic Energy Commission.

0472
SPACE AND THE ATOM (1971). 27½ minutes, color.
Suitable for Understanding Level-3.
CLEARED FOR TV.
Success in the coming decades of space exploration will in large measure be predicated upon an increasing use of nuclear energy. As payloads become larger and mission lifetimes become longer, the use of nuclear energy represents the only alternative to mission success—especially for on-board electrical power and higher powered propulsion systems. This film reports on many of the past successes of nuclear energy in space, such as the various SNAP generators used on SNAP-3A, 9A and 10A. It also discusses the success of these radioisotopic generators on the recent Apollo lunar missions and Nimbus weather satellites. It also delineates the twelve year joint efforts of the former U. S. Atomic Energy Commission (now ERDA) and the National Aeronautics and Space Administration to develop a nuclear rocket engine.

ORDER BY FILM NUMBER AND TITLE

0354
SRE CORE RECOVERY FOLLOWING FUEL-ELEMENT DAMAGE (1962). 29½ minutes, color.
Suitable for Understanding Level-3.
CLEARED FOR TV.
Describes (1) design features of the Sodium Reactor Experiment (SRE) near Santa Susana, California [de-



signed, constructed, and operated for the USAEC (now ERDA) by Atomics International]; (2) important operations attainments; (3) circumstances in 1959 which resulted in severe damage to the reactor core and release of about 10,000 curies of fission-product activity; (4) equipment, methods, and procedures employed to contain gaseous atmospheres, to remove radioactive debris (including pieces of fuel elements from the reactor system), and to replace affected core-moderator cans; and (5) modifications made to prevent similar future difficulties. Included are actual motion-picture scenes of the highly radioactive reactor core and animation of fuel-element damage and breakage. A relatively small number of men performed the recovery-work operations; none of the men received more than the standard permissible amount of radiation exposure, and there were no physical injuries. Demonstrated was the fact that extensive maintenance work can be conducted on the entire plant complex of a sodium-cooled nuclear-power reactor with a reasonable degree of effort.

ORDER BY FILM NUMBER AND TITLE

0444
THE STORY OF OAK RIDGE OPERATIONS (1971). 28 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

The breadth and scope of the Nation's atomic energy program—from the synthesis of minute quantities of man-made elements for special research to the highly automated production of tons of enriched uranium for fueling nuclear power plants—are embodied in the programs of ERDA's (formerly AEC) Oak Ridge Operations. As one of the ERDA's largest and most diverse field offices, Oak Ridge Operations is responsible for the work of plants and laboratories in four states and Puerto Rico which employ some 20,000 persons in programs of nuclear research and production.

In nontechnical language, the film covers the major activities of Oak Ridge Operations which support programs of national defense and the peaceful applications of atomic energy. A major segment of the film explains how three gaseous diffusion plants are meeting the demand for enriched uranium to fuel nuclear power plants in this country and abroad; the process of gaseous diffusion is explained and methods of increasing production capacity are also presented. Research activities of the Holifield National Laboratory are highlighted, including a major experimental effort to control the thermonuclear reaction which could lead to the development of fusion reactors, and studies on the environment. The use of radiation to diagnose and treat disease in a unique Oak Ridge hospital is covered. Also receiving attention are the nuclear-related studies of the Agricultural Research Laboratory in Oak Ridge and the research and education programs carried out by the Puerto Rico Nuclear Center.

HONORS: 14th Industrial Photography Awards, Chicago, Illinois; First Prize, 13th Annual Conference of the Information Film, Hollywood, California.

0357
A STUDY OF GRAIN GROWTH IN BeO USING A NEW TRANSMITTED LIGHT HOT STAGE (1965). 16½ minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

Film report (based on ceramics technology research conducted for the Fuels and Technology Branch, Division of Reactor Development and Technology, ERDA (formerly AEC) depicts the design and operation of a new hot stage used with a polarizing microscope and transmitted light. Time-lapse color cinematography makes possible the observation of time-dependent reactions and structural changes in transparent crystalline materials at temperatures as high as 2000°C. Sequences are shown of studies of thin sections of beryllium oxide ceramics at about 1700°C in vacuum. Movement of pores and grain boundaries, grain growth, and surface evaporation effects were seen. The film describes the physical basis for some of the observations, and the determination of quantitative grain-growth kinetics from the photographic records.

HONORS: 5th International Festival of Science Films, Lyon, France.

0484
A SUPERCONDUCTING MAGNET FOR FUSION RESEARCH (1971). 22 minutes, color.

CLEARED FOR TV.

In nuclear research intense magnetic fields are generally agreed to be the most promising means of confining hydrogen plasma to produce controlled fusion energy on earth.

At the ERDA Lawrence Livermore Laboratory of the University of California, a 13 ton superconducting magnet has been designed and fabricated for the new Baseball II neutral beam injection experiment. This huge liquid helium-cooled magnet operates at cryogenic temperatures and is capable of containing dense gases whose temperature reaches 300,000,000 degrees centigrade.

This film describes the general concept of the experiment, the winding and installations of the magnet system, and initial testing of the new fusion research facility.

HONORS: First Prize, 13th Conference of the Information Film Producers of America, Hollywood, California; 20th International Exhibition of Specialized Cinematography (Nuclear Rassegna) Rome, Italy; 10th ANZAAS International Scientific Film Exhibition, Australia.

0358
SUPERCONDUCTING MAGNETS (1967). 12½ minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Many important areas of research and development involve the use of large electromagnets. These large magnets require correspondingly large amounts of power and cooling equipment. By constructing these magnets with superconducting cable, it is possible to produce coils which require no power to operate. This film is an introduction to the subject.

Superconductivity was first discovered in 1911 by the Dutch physicist, Kammerlingh Onnes, but commercial materials were not available until 1961. Already several hundred small superconducting magnets are being operated in laboratories throughout the world, and a number of large magnets have been operated successfully. This rapid development has been made possible by ingenious magnet and fabrication techniques. These designs make it possible to produce completely stable magnets of very large size. This film describes the basic design problems and includes pictures of the ERDA Argonne National Laboratory's 67,000 gauss magnet during fabrication and testing.

HONORS: Gold Transistor Award, 15th International Electronic, Nuclear. Radio, and Motion Picture Congress, Rome, Italy; Chris Statuette, 15th Columbus Film Festival; International Association of Machinists & Aerospace Workers Conference, San Jose, California; Science Film Theater, American Association for the Advancement of Science, Boston.

0428
SYNCHROTRON (1968). 14½ minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Discusses the components and operation of the Cambridge Electron Accelerator (CEA), a high energy physics research laboratory funded by the ERDA (formerly AEC), operated by MIT and Harvard University.

Dr. William Shurcliff, a physicist and Senior Research Associate at the CEA, explains the synchrotron, showing key components by means of a visit to the accelerator, animation and cutaway models. Drawings show the injection of the electrons (bullets), their entrance into the 240-foot-diameter accelerator ring, their acceleration to more than 99 percent the speed of light, and how they are released from the synchrotron to strike the nuclei and particles in the nuclei of atoms, thus permitting physicists to study the interaction between particles and the creation of new sub-atomic particles.

In the large, complex Experimental Hall, we watch scientists and technicians in a variety of experiments to test old and new theories of the basic nature of matter, using bubble chambers, scintillation counters and spark chambers.

0365
TERNARY PHASE DIAGRAMS (1965). 7 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

Depicts the development of a new and rapid technique for preparation of ternary phase diagrams required in the search for useful alloys. Since there are more than 4,000 combinations of three-element alloys which can be made from common metals alone, a comprehensive collection of such diagrams is needed. The technique shown for determining ternary phase alloy diagrams makes it possible to circumvent a previously tedious, time consuming, and costly research procedure.

HONORS: 4th International Festival of Scientific & Technical Films, Brussels, Belgium.

0421
TERRADYNAMICS (1968). 21 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Documents the earth penetration program at Sandia Laboratories—a pro-

gram concerned with determining the nature and composition of sub-surface soil using earth-penetrating, ballistic vehicles. With emphasis on current technology, the film shows early experimentation, the evolution of the program, the delivery techniques and design of several penetration vehicles, plus a typical recovery operation and post-recovery analysis. It also discusses the unique soil-motion studies conducted in a laboratory environment, substituting a cohesionless material for soil, which make it possible to photograph the displacement of individual particles during the penetration process; animation explains basic engineering concepts. The film ends with a brief discussion of the future applications of penetration technology.

0366
TESTING FOR TOMORROW (1965). 29 minutes, black and white.
(From the Challenge Series.)
Suitable for Understanding Levels-2 and -3.
CLEARED FOR TV.
Aspects of nondestructive testing as employed in a nuclear laboratory are depicted. Among the techniques, many of them newly developed, are neutron radiography, eddy current testing, ultrasonic detection of voids, and ultrasonic television scanning. The film provides an in-depth description of basic research in the nuclear sciences at ERDA's Argonne National Laboratory.

0368
THORIUM—U-233 UTILIZATION (1964). 13 minutes, color.
Suitable for Understanding Level-3.
CLEARED FOR TV.
Discusses thorium-232 as fertile material, currently in use in three commercial power reactors, and the commercial fabrication of ceramic urania-thoria. Also shown are other fuel and reactor concepts being developed, such as the molten-salt experiment, and the preparation of the first uranium-233 enriched thorium fuel by the Sol-Gel process.

0370
TIME—THE SUREST POISON (1962). 29 minutes, black and white.
(From the Challenge Series.)
Suitable for Understanding Levels-2 and -3.
CLEARED FOR TV.
Explores the natural process of aging and the methods used in its study. Aging might be considered one of the deleterious side effects of radiation since radiation injury resembles natural aging in so many ways. Results of study of the aging process involving the use of radiation are presented. The conduct of research on animals using low-level gamma irradiation is illustrated.

The film provides an in-depth description of basic research in the nuclear sciences at ERDA's Argonne National Laboratory.

0488
TO BOTTLE THE SUN (1973). 5½ minutes, color.
Suitable for Understanding Levels-2 and -3.
CLEARED FOR TV.
With coal, gas and oil in limited supply, where will we turn to satisfy our future expanding energy needs? Some scientists believe it may be the thermonuclear process, called fusion, that powers the sun. This fusing of atoms releases large amounts of energy. Scientists at ERDA laboratories and elsewhere in the world are seeking to control the fusion process to generate electricity.

Dr. Robert L. Hirsch, Director of ERDA's Division of Controlled Thermonuclear Research, explains that fusion fuel—a form of hydrogen found in ordinary seawater—is virtually in limitless supply. But there are enormous technical problems yet to overcome. Fusion fuels must be heated to 100-million degrees to form a special kind of gas, called a plasma, so hot that no solid material can contain it. Scientists, therefore, have turned to magnetic fields as the fusion-plasma container. But what bottle shape will be most effective?

Dr. Harold Furth explains that at Princeton University doughnut-shaped magnetic bottles are being studied as a means of avoiding plasma leakage from ends—in the effort to eventually develop a power-producing commercial fusion reactor. The film explains that fusion power stations would be safe, environmentally attractive, and could be located in heavily populated urban areas where power needs are the greatest. Dr. Hirsch notes other promising lines of research—for example: laser beams to trigger the fusion reaction without magnetic fields, or direct conversion of plasma energy into electrical energy. But there is much research yet to be done internationally before fusion power can be achieved on a commercial basis, hopefully before the turn of the century.

HONORS: USIA "Sources of Energy Exhibit" traveling to 20 countries; American Society of Civil Engineers, National Structural Engineering Convention, Cincinnati, Ohio; 6th Annual Industrial Film Festival, Chicago, Illinois; International Trade Fair Energy Spectrum, Salonika, Greece; II International Festival of Science Fiction Films, Trieste, Italy.

ORDER BY FILM NUMBER AND TITLE

0474
TO IMITATE THE SUN (1971). 33 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

One of the rarest basic research programs now gripping the minds of nuclear physicists the world over is controlled thermonuclear fusion. After more than a quarter century of research and experiment, scientists believe they are close to demonstrating the scientific feasibility of the fusion concept.

This film depicts the theoretical challenge of such controlled fusion and describes many of the research machines that are being used to investigate plasmas of thermonuclear regimes. It also touches upon what environmental and economic advantages may accrue from future fusion power reactors. The film also includes descriptions of the four major American fusion devices, Two-X-Two, Astron, Scyllac and ORMAK, as well as discussions on the modeling of plasmas by such internal ring machines as the D.C. Octupole and the Spherator.

HONORS: Chicago International Film Festival, Illinois; 16th International Festival of Scientific and Educational Film, University of Padua, Italy; National Educational Film Festival, Oakland, California; 14th American Film Festival, New York City, New York; IV International Scientific Film Festival, Rio de Janeiro, Brazil; 10th International Tech Film Review, Pardubice, Czechoslovakia; 6th International Festival of Scientific and Technical Films, Brussels, Belgium.

0375
TRACING LIVING CELLS (1962). 29 minutes, black and white.

(From the Challenge Series.)

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Radioactivity is often mankind's servant. In recent years, the use of radioactive isotopes in the study of cell division and in medical therapy has helped man overcome disease. This film demonstrates some of the many helpful and healthful uses of atomic energy, including use of radioactive tracers in blood and cancer research.

The film provides an in-depth description of basic research in the nuclear sciences at ERDA's Argonne National Laboratory.

0378
TRANSCURIUM ELEMENTS: SYNTHESIS, SEPARATION AND RESEARCH (1965). 31 minutes, color.

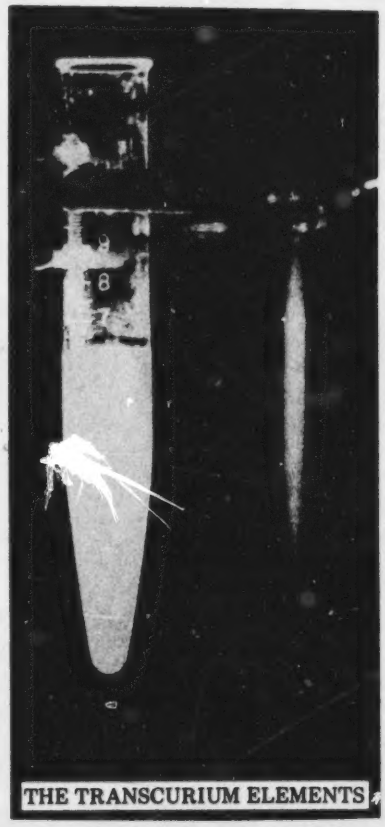
Suitable for Understanding Level-3.

CLEARED FOR TV.

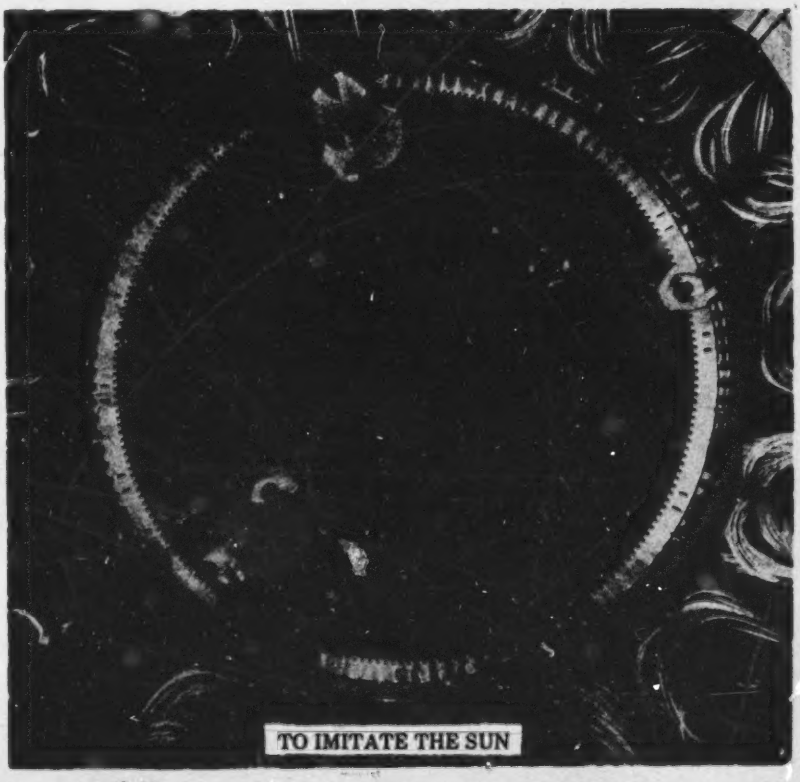
Describes three basic transcurium research experiments at the ERDA's Lawrence Radiation Laboratory by University of California scientists. Transcurium element research is part of a continuing program at the laboratory designed to further the knowledge of the chemical nature and nuclear structure of the recently discovered heavy elements, berkelium, californium, einsteinium and fermium.

The specialized separation work in research was performed at the laboratory after the elements were synthesized in the Materials Testing Reactor at the ERDA's National Reactor Testing Station in Idaho. The film shows the capsule containing a one-gram mixture of plutonium-242, americium-243, and curium-244 being released from the reactor after four years of irradiation in the highest neutron flux region of the core. The process of transmuting one element to the next heavier by neutron capture is illustrated in the film.

The chemical separation techniques and equipment are explained



THE TRANSCURIUM ELEMENTS



TO IMITATE THE SUN

during operational tests. Photography through the observation window depicts some of the significant steps in the chemical separation. A dramatic part of the separation occurs when the curium can be seen separating from other elements by its luminescence or light generated by radioactivity.

The first research experiment illustrates the discovery of a new isotope of fermium of mass 257. The next experiment shows the measurement of the neutron induced fission of einsteinium-253. The final experiment explains how 70 percent of the world's supply of purified berkelium was formed into a crystal to concentrate its self-luminescent light.

HONORS: First Prize, 3rd International Film Festival of Industrial & Commercial Films, Brussels, Belgium; 5th International Festival of Science Films, Lyon, France; 12th International Nuclear Congress, Rome, Italy; 3rd International Festival of Films on Science, Toronto, Canada; International Exhibition of the Scientific—Didactic Film, Padua, Italy; American Film Festival, New York City, N. Y.; Chris Award, Columbus Film Festival, Ohio; Meritorious Participation, San Francisco Film Festival, California.

0419
THE TRANSURANIUM ELEMENTS (1968). Part I: 58 minutes; Part II: 70½ minutes; black and white.

Suitable for Understanding Level-3.

CLEARED FOR TV.

This two-part professional level lecture by Dr. Glenn T. Seaborg, Nobel Laureate and former Chairman of the U. S. Atomic Energy Commission, was produced from a TV tape recorded at the Tenth Anniversary Summer Science School at the University of Sydney, Australia, in January 1967. Dr. Seaborg describes the work leading to the discovery of all the known transuranium elements—from element 93 through element 104. The lectures are illustrated with slides explaining the production of these new, man-made elements. Some practical applications of transuranium elements and the possibility of making even newer, very heavy elements are also discussed. This film provides the opportunity of seeing and hearing a famous scientist personally describe some important nuclear age discoveries in which he played a major role.

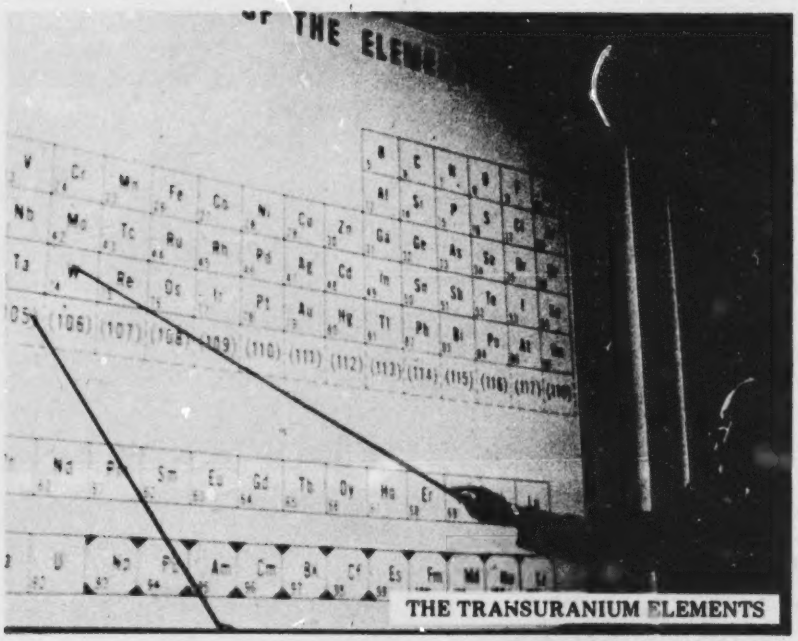
HONORS: ANZAAS 4th International Scientific Film Exhibition, Australia & New Zealand.

0423
TRIP STEEL (1968). 11 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

TRIP (transformation-induced-plasticity) is a new series of thermomechanically treated, highly alloyed steels combining high ductility and high strength. Tensile ductilities of 25% to 50% at strength levels above 200,000 psi are obtainable. The steels can be produced having wide ranges of composition and properties. Through closeup photography, the film shows the transformation that occurs in TRIP steel as load is applied to both notched and tensile specimens. When specimens are pulled in tension, a surface upheaval is clearly evident by the appearance of horizontal lines. This upheaval or surface tilting is a consequence of the change in crystal structure of the steel occurring during straining. During this phase, the sample elongates to a surprising degree. During a later stage oblique lines, again representative of the transformation, travel up and down as the stress level is increased. This transformation redistributes the stress on the sample to temporarily prevent necking down and a break.



0384
UNDERGROUND NUCLEAR WEAPONS TESTING (1972). 28½ minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Explains the responsibility of the ERDA (formerly AEC) to test nuclear weapons—work vital to the U. S. national interest and the defense capabilities of the Free World. The film shows how weapons tests at the Nevada Test Site (in central Nevada and on Amchitka Island in the Aleutian chain) are carried out safely underground in a manner designed to contain radioactivity within the ground, within the framework of the limited test ban treaty.

The film explains various types of nuclear tests: developmental—to check out concepts of weapons design; proof tests—to confirm safety and design of weapons going into production; checks on the readiness of weapons in the stockpile; and, in cooperation with the Department of Defense, tests to obtain information on effects from nuclear explosions.

The film discusses and illustrates: how proposals for development tests of nuclear devices are brought into being; the various steps in evaluating and approving proposals; the facilities at the main test areas—remote Frenchman and Yucca Flats and the isolated Pahute Mesa; the setup at CP-1—the Control Point and nerve center for operations.

The film shows: techniques for the drilled vertical shafts; the complex instrumentation; lowering of the nuclear device into the shaft; backfilling of shafts; scenes at the Control Point, where the complex timing and firing systems are located; the careful weather briefings and other stringent safeguards to assure public safety; monitoring techniques, air sampling, assay of water and vegetation, aerial sweeps. We watch the progress of a

DERGROUND NUCLEAR WEAPONS TESTING

typical test with animation to illustrate what has happened underground.

0441
THE WARM COAT (1969). 13½ minutes, color.

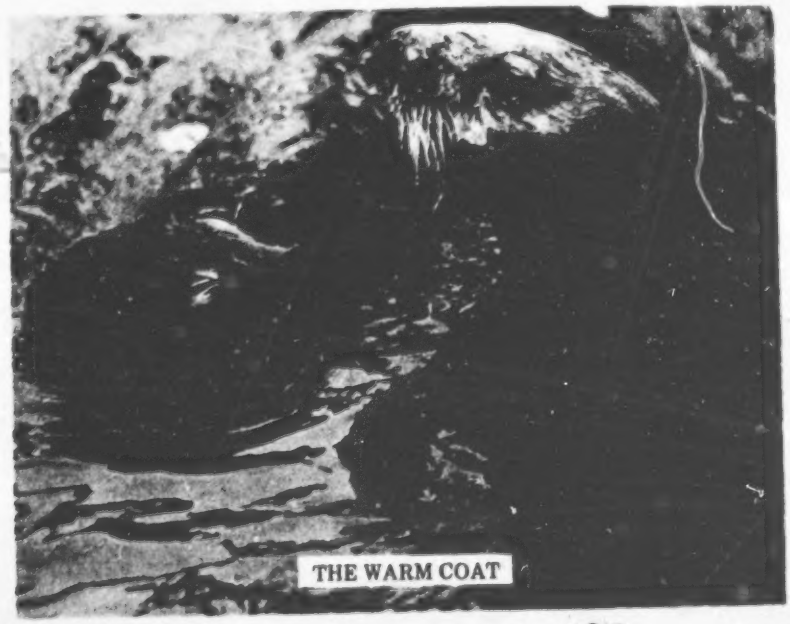
Suitable for Understanding Levels-1, -2, and -3.

CLEARED FOR TV.

A conservation story of the transplant operation of sea otters from Amchitka to Alaskan coves. Almost extinct at the turn of this century, the sea otter, known for its fine, dense, very valuable fur, is staging a comeback in Alaskan waters. The State of Alaska, with cooperation from ERDA (formerly AEC), has airlifted several hundred sea otters from Amchitka, an island in the Aleutian chain, to other areas where natural food resources are more plentiful and where large otter colonies had lived centuries ago. The transplant took place in the summer of 1968 and, hopefully, sea otters will thrive and multiply in the new environment.

THE WARM COAT is a film that watches the shy, whiskered bright-eyed sea otter dive and swim with easy grace. It catches him at play and attending to the business of survival . . . caring for pups, dining on great quantities of shellfish and other foods from the sea, hiding from his enemies in tangled beds of sea kelp.

HONORS: 2nd International Fishing & Hunting Film Festival, Yugoslavia; Golden Eagle, CINE (Council for Non-theatrical Events), Washington, D. C.; 2nd International Scientific Film Festival, Rio de Janeiro, Brazil; Argentine Film Festival, University of Buenos Aires, Argentina; 13th International Days of the Short Film (Festival of Tours), France; 17th International Nuclear Congress, and Golden Rocket, 11th International Award of the Technical Cinema, Rome, Italy; International Small-Sized Film Festival, Salerno, Italy; 5th International Festival of Countries and Peoples, La Spezia, Italy; 8th International Festival of Marine and Exploration Films, Toulon, France; 4th Festival of Scientific and Technical Films, Yugoslavia; 1st International Film Festival on the Human Environment, Montreal, Canada.



THE WARM COAT

0391
WASTE DISPOSAL BY HYDRAULIC FRACTURING (1966). 11 minutes, color.

Suitable for Understanding Level-3.

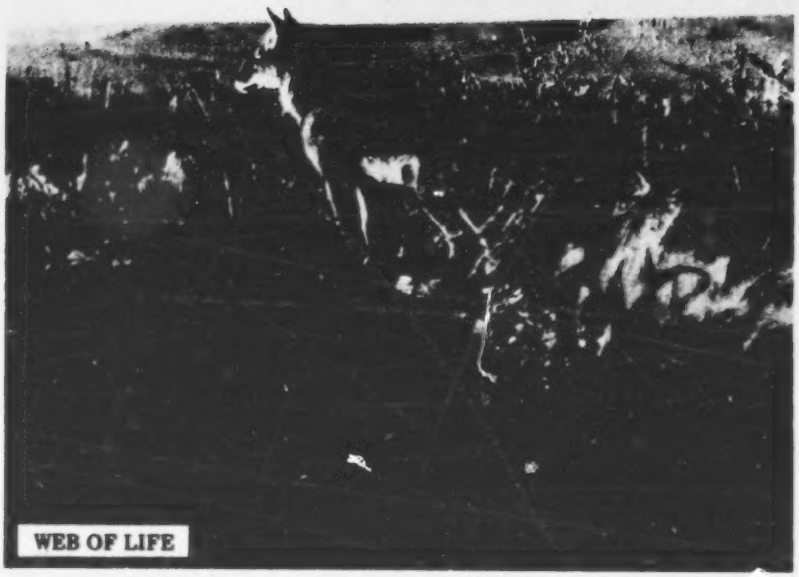
CLEARED FOR TV.

Depicts the development, at Holifield National Laboratory, of a process for the disposal of intermediate-level radioactive wastes in underground bedded shale formations. The film shows an actual injection of material into the formation, supplemented by animation which portrays the manner in which the grout is forced down into the well and then into the fracture for permanent disposal.

0430
THE WEATHER EYE (1969). 13 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.



The story of the design, development and fabrication of SNAP-19, a small, long-lived, radioisotope-fueled nuclear generator whose mission is to be the auxiliary power supply to produce electrical power aboard a Nimbus weather satellite 600 nautical miles above the earth. As the orbiting Nimbus monitors changing weather patterns in the atmosphere, SNAP-19 supplements the work of solar cells in powering the data-gathering instruments and transmitters that supply information continuously to meteorologists on earth. Nimbus 1 and 2 weather satellites used only solar cells. Now, SNAP-19, which can operate continuously in sunlight or darkness, gives NASA and ERDA (formerly AEC) the opportunity to study onboard nuclear energy as an electrical power source for instrumentation. The film describes the design, testing and fabrication of the generators, in which the heat from the radioisotope plutonium-238 is converted directly to electrical power by means of thermocouples. To assure SNAP-19's safety and integrity, vibration and acceleration tests are conducted. Seals and materials are tested under many conditions, including the simulated cold and vacuum of space—not only for the important weather satellite mission, but also to gather data for the day when power from radioisotopes will help men explore distant worlds.

HONORS: 70th International Convention in Electronics Engineering, New York City, N. Y.

ORDER BY FILM NUMBER AND TITLE

0480

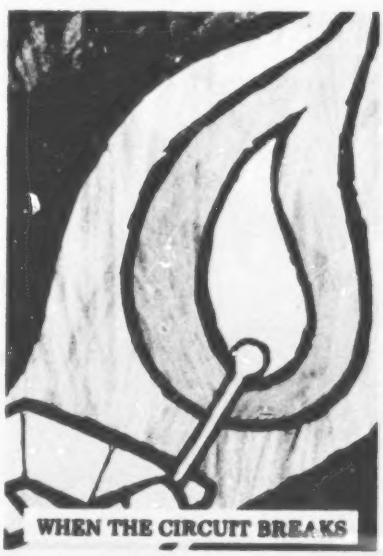
WEB OF LIFE: Endless Chain (1972). 28 minutes, color.

Suitable for Understanding Levels-1, -2, and -3.

CLEARED FOR TV.

This tour de force is a version of the film ENDLESS CHAIN produced without narration. Now presented with an improved musical score, a ballad and sound effects, the film takes an intimate look at the endless chain of life in the desert as recorded by Tom Beemer, nationally acclaimed nature documentarian. One test of a good film is—does it "play" without narration? WEB OF LIFE does more than play—it lives. Without narration, this film will be particularly useful to younger audiences and all age groups. This no-talk version will be ideal for club meetings, nature study, environmentalists and biology classes. Of course, foreign audiences will appreciate this treatment. For descriptive subject matter, see the description for ENDLESS CHAIN, on page 25.

HONORS: 23rd International Exhibition of Documentary and Short Films, Venice, Italy; Edinburgh Film Festival, Edinburgh, Scotland; 22nd International Film Festival "Nature, Man and His Environment," Milan, Italy; 1st International Festival on the Human Environment, Montreal, Canada; 4th International "Hunting and Fishing" Film Festival, Novi Sad, Yugoslavia.



0503

WHEN THE CIRCUIT BREAKS (1975). 27½ minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

This film has some important things to say about the energy crisis and our continuing energy problems: that demand for energy is increasing, and that our domestic supply is diminishing. The solution to our problems lies in our ability to fully develop our resources of coal, oil and natural gas. It lies in our ability to quickly develop new sources of nuclear energy (such as the "breeder"), geothermal and solar energy. And it lies in our willingness to conserve all forms of energy now.

WHEN THE CIRCUIT BREAKS illustrates that there are many opportunities for conserving energy. We can conserve at home, in transportation, in business, and in industry. The meaning is clear: to meet the challenge of the energy crisis, we must change our energy habits while, at the same time, we are finding better and more efficient ways to use our current fuels and developing new methods to harness and produce vast amounts of energy.

We see the search for new oil and gas sources, underwater drilling for oil, the piping of natural gas over long distances, the location of oil shale deposits, antipollution devices to screen out more than 99 percent of the ash and waste from coal-fired generators (using dirty coal in a clean way), the possibility of nuclear fusion with lasers, geothermal power (heat from beneath the surface of the earth), solar heated homes and factories, and others.

Scientists and engineers are engaged in basic research now to find other sources of energy: wind power, coal liquefaction (making oil from coal), underground coal gasification

(making gas from coal), breeder reactors, tidal power.

Someday, perhaps, nuclear fusion (using the unlimited heavy hydrogen in seawater as fuel) or harnessed solar energy for electricity will achieve man's age-old dream of unlimited energy. In the meantime, we must conserve the energy we have while we look for new energy sources.

0393
THE WOODEN OVERCOAT (1965). 14 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

Because radioactive materials are being shipped throughout the world in increasing quantities, research programs are being conducted to develop shipping containers for radioactive materials which are virtually accident-safe. In support of these programs, the Energy Research and Development Administration (formerly AEC) has asked its contractors to submit designs for containers. Sandia Corporation of Albuquerque, New Mexico, has designed and tested a wooden outer shell for existing metal containers which will withstand a 30-foot drop, a one-hour petroleum fire, and 24-hour water immersion without the seal of the inner metal container of radioactive material being broken. This technical film report shows the development and testing of the wooden containers as well as the buildup of the containers from rings of plywood. Photography of actual drop tests and fire tests is included to demonstrate the resistance of the container to both impact shock and fire exposure. Results of tests show that a container having six-inch thick shells of fir plywood will adequately protect the inner metal container of radioactive material.

0396
WORKING WITH RADIATION (1962). 29 minutes, black and white.

(From the Challenge Series)

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

When properly handled in the laboratory, radioactive materials constitute little danger. This film shows precautions used in working with radiation as well as research effort being made to gain more knowledge about handling radiation. "Hot caves" (radiation chambers) using remote-control mechanical manipulators, caves using electronic type manipulators, and giant caves using heavy-duty manipulators illustrate the safety methods mentioned. Methods used to dispose of radioactive waste materials are also shown.

This film provides an in-depth description of basic research in the nuclear sciences at ERDA's Argonne National Laboratory.

THE WORLDS WITHIN

0398
THE WORLDS WITHIN (1963). 29 minutes, color.

Suitable for Understanding Levels-2 and -3.

CLEARED FOR TV.

Describes the design, construction and use of SLAC, the new Stanford Linear Accelerator. A comparison is made of the various methods man uses to "see" particles of smaller and smaller dimension—using the magnifying glass, the microscope, the electron microscope, and the electron linear accelerator. Some historical background is given on the development of the linear accelerator. Scientists and engineers involved in the SLAC project discuss the theory of its operation and some of the problems related to building and operating this huge instrument to explore the structure of the atom and discover new particles. The fabrication of the 2-mile long copper tube, with a bore of only one inch in diameter, through which atomic particles will be fired, is shown and explained in some detail.

0402
XENON TETRAFLUORIDE (1962). 5½ minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

Shows how chemists at ERDA's Argonne National Laboratory have succeeded in making xenon combine chemically with fluorine—the first combination of xenon and one other element, a chemical reaction previously thought to be impossible—which has opened up a new area for the study of chemical bonding. The film shows the preparation of the compound in the laboratory under special conditions of temperature and pressure. The ingredients are sealed in a glass vacuum tube and first heated to 400°C for one hour, then cooled rapidly to room temperature. Crystals of xenon tetrafluoride—the new compound—grow before your eyes. Tests to substantiate the exact nature of the compound are illustrated, and future experiments on forming compounds with rare gases are discussed.

HONORS: ANZAAS 3rd International Scientific Film Festival, Australia & New Zealand.

0460
YANOMAMA: A MULTIDISCIPLINARY STUDY (1971). 43 minutes, color.

Suitable for Understanding Levels-2 and -3.

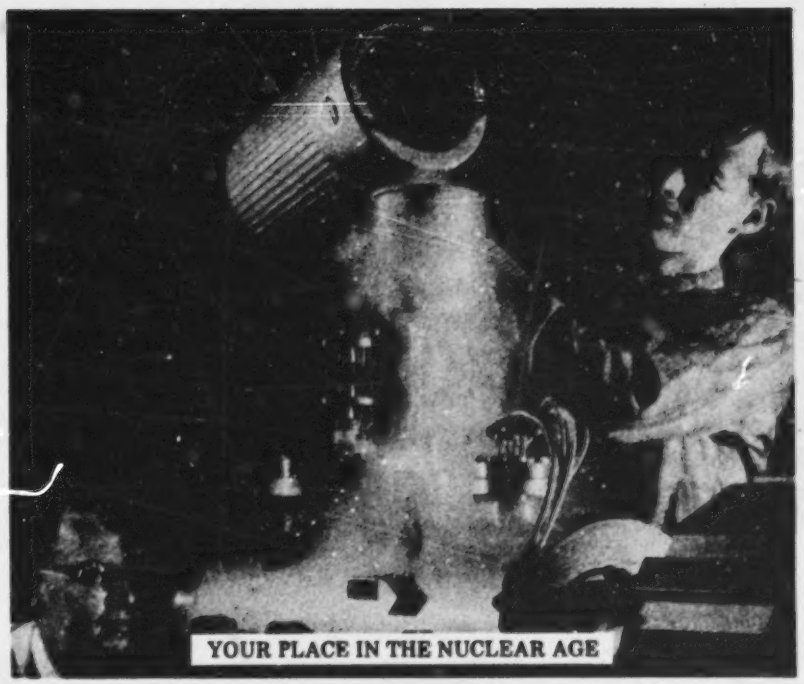
For sale by NAC. Approval for television use must be obtained from ERDA's Audiovisual Branch, Office of Public Affairs.

Although this unusual film was produced primarily for college and university classes in anthropology and genetics, it will be of interest to all educational levels and general public audiences. Produced by ethnographic film-maker Timothy Asch of Brandeis University, anthropologist Napoleon Chagnon and geneticist James V. Neel of the University of Michigan, the film illustrates the field techniques used by a team of specialists—from such disciplines as human genetics, anthropology, epidemiology, dentistry, linguistics and medicine—in one of a series of biological-anthropological studies of the Yanomama Indians in the dense jungles of Venezuela and Brazil sponsored by the U. S. Atomic Energy Commission, the National Science Foundation and the National Institute of Mental Health. One of the aims of the project was to discover how physical and cultural factors influence a primitive and isolated population's genetic and demographic characteristics—data basic to understanding man's genetic legacy.

The film describes the scientific objectives, the nature of the problems the team was attempting to study, the kind of data required to discuss these problems, and the significance of tribal populations in the studies of human biology. A thumbnail sketch of the Yanomama culture follows, touching on economy, ritual, daily activities, manufactures, fighting and other selected features of the society. The main body of the film deals with a closer view of each investigator's role in the study and how he goes about

collecting data—such as dental casts, blood samples, saliva specimens, language materials, genealogies—and the often warm interpersonal relationships between the researchers and the Yanomama.

HONORS: 4th International Congress of Human Genetics, Paris, France; Golden Eagle, CINE (Council for Non-theatrical Events), Washington, D. C.; Second Prize, 14th American Film Festival, New York City, N. Y.; National Educational Film Festival, Oakland, California; Sidney Film Festival, Sidney, Australia; 9th International Educational Film Festival, Teheran, Iran; 10th International Festival of Science Films, Trieste, Italy; IV International Scientific Film Festival, Rio de Janeiro, Brazil; Edinburgh Film Festival, Edinburgh, Scotland; 22nd International Festival for Tourist and Folklore Films, Brussels, Belgium; 13th International Review of Social International Films, Florence, Italy; 21st International Competition of Mountain and Exploration Films, Trento, Italy.



YOUR PLACE IN THE NUCLEAR AGE

0452
YOUR PLACE IN THE NUCLEAR AGE (1969). 26 minutes, color.

Suitable for Understanding Level-2.

CLEARED FOR TV.

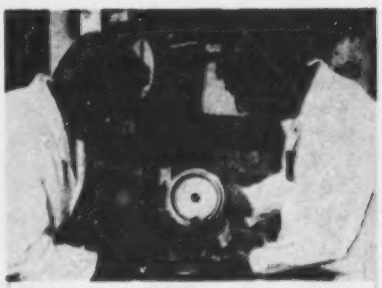
Gives the student a picture of the professional environment in which he would be working if he chose a career in nuclear science or engineering. The three major employment areas covered are ERDA's laboratories, commercial nuclear industries, and colleges and universities. Each has a need for trained manpower in nuclear science and technology.

The need for creative ideas is essential to the development of nuclear energy, whether it be in basic or applied research. In a fast-moving field such as nuclear technology, the professional person is expected to prepare reports for scientific and technical journals, attend national or international meetings, and maintain contact with other specialists in his field to stay abreast of the latest developments.

For those more interested in the production and development side of the nuclear business, there are numerous opportunities in the growing nuclear power industry. The advantages of and the opportunities for continuing education are again emphasized.

One of three films in nuclear science and nuclear engineering produced with the assistance of the American Nuclear Society.

The basic purpose of these three films is to motivate students in their formative years to consider careers in the field of nuclear science and engineering. (Use with HORIZONS UNLIMITED, page 33, and PREPARING FOR TOMORROW'S WORLD, page 45.)



THE ZONAL ULTRACENTRIFUGE

0475
THE ZONAL ULTRACENTRIFUGE (1971). 6 minutes, color.

Suitable for Understanding Level-3.

CLEARED FOR TV.

In man's continual attack on human diseases, molecular biologists have begun to employ new zonal ultracentrifuges which are capable of the rapid fractionization of large volumes of cell constituents. These centrifuges were developed out of the Molecular Anatomy on Man Program at the ERDA Holifield National Laboratory under the direction of Dr. Norman G. Anderson. This film depicts the loading, separation and unloading operation of the new centrifuge and touches upon their role in the purification of viruses using improved operation capabilities.

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Produced by Donner Laboratory and ERDA's Lawrence Berkeley Laboratory
For sale by National Audiovisual Center

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*See Sales Source Addresses page 71.

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REQUEST FOR ERDA FILMS

Instructions: Fill in the form below and send a copy to **ERDA Film Library, Technical Information Center, P. O. Box 62, Oak Ridge, Tennessee 37830.** Read reverse side of this form. Please Print or Type

Please write appropriate numbers in boxes [ ][ ]

01 College, Jr. College, University
02 Elementary or High School
03 Federal Agency
04 State or other Municipal Organization
05 ERDA Contractor
06 Professional or Technical Society
07 Civic or Service Club
08 TV Station
09 Commercial Organization
10 Other

Send Films To

Organization

Address

City | State | Zip Code

Individual | Date

Telephone Number | Requested By (Signature)

File Number	Film Title	Show Date	Alternate 1 Show Date	Alternate 2 Show Date	Check If You Will Take First Available Date

NOTICE TO ERDA FILM REQUESTER

You will receive film which has been cleaned and inspected by our Film Library and is in serviceable condition.

Projection must be on good 16-mm motion picture sound equipment and by a trained operator.

Film should be rewound after the last showing and be returned to the ERDA Film Library on or before the due date.

You will be required to provide information on the size of the audience and other miscellaneous data, as well as observe the following:

1. Use any available means—including air express, air mail, or personal delivery—to assure that film being returned will reach the ERDA Film Library on or before the due date. **Return shipment charges are borne by the borrower.**

2. No borrower under any circumstances may remove—even temporarily—any footage from ERDA Library film on loan to him, either to delete damaged sprocket holes or to edit or digest selected scenes.

3. No borrower may hold a film past scheduled return date without express prior permission of the ERDA Film Library.

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Optimum service to the thousands of borrowers utilizing the Film Library is possible only when each individual borrower complies fully with the above instructions.